

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Marland's Improvements for Utilizing the Heat of Boiler Furnaces.

The accompanying illustrations represent an apparatus patented by Mr. O. Marland, for the purpose of securing a greater economy of fuel in boiler furnaces, &c. In Fig. 1, a cross section of the apparatus is shown near the front end of a boiler setting. In this case the boiler is represented as a plain tubular. Fig. 2 shows a cross section at the back end, and Fig. 3 is a longitudinal section. The device is an application of the well-known principles of the Siemens regenerative furnace. The draft is controlled, or rather furnished, by a pair of Roots blowers, and the outgoing hot air from the furnace is divided into three streams, between which the cool air to support combustion is forced, so as to highly heat it before it enters the furnace, while the products of combustion are proportionately cooled. In Fig. 1, H is an air pipe connecting with all the passages, A, and conducting air from them to the branch pipes P and J', by which the air is distributed into the ashpit, over the bridge wall and to other portions of the furnace, as K and L in Fig. 3. D and N are the cases of the two Roots blowers, N being used to

this be utilized we should have a horse-power for about 1-5th of a pound of coal per horse-power per hour. The best engines, however, use ten times as much, or 2 pounds, and the great majority of engines use from 15 to 20 times as much, or say from 3.25 to 4.25 pounds of coal per horse-power per hour. When we come to a theoretical consideration of the amount of heat which may be utilized in a steam engine with the existing conditions and the temperature at which we have to exhaust steam into the atmosphere, say 213° F., we find that, theoretically, we can use only about 16.9 of the heat in the steam. An engine of the better high-pressure type, Mr. Hoadley shows, following out this line of reasoning, utilizes in all about 35.5 per cent of all the heat which theory would indicate as possible. This leaves two-thirds of the 16 per cent still to be striven for in our efforts toward economy, and this is usually lost. A large portion of this loss is usually charged to the engine, but the boiler comes in for its share, and after a very careful calculation, too long to be here reproduced, two tables are given which show the losses to be charged to the boiler, which are caused by the admission of cold air and the necessary

rather than overstating the matter to say that the average of good practice would show a double supply of air. If we take as the most common boiler pressure in stationary boilers 80 pounds per square inch above the atmosphere—say, 95 pounds absolute—its temperature, 324° F., will be that of the cooling surface to which the hot gases are exposed. In strictness, the temperature of the outside of the boiler plates will be higher than this, as 324 degrees must be about their temperature inside, and the transmission of heat from without implies a higher temperature on the outer surface. Data exist for the computation of this exterior temperature under given conditions, but the computation is unnecessary here. It is probable that there can be no active transmission of heat from the gases without to the water within a boiler, with less than 75 degrees difference of temperature within and without, which will include the difference in the two sides of the plates. Prof. Dwellshauvers-Dery, in an article published in the *Revue Industrielle des Mines*, of which a translation appears in Van Nostrand's *Engineering Magazine* for February, 1880, estimates this difference at 91° C. = 164° F., which

in the boiler, say within 75 degrees, making their ultimate temperature, on release, 60 + 75 = 135 degrees. This is not too hot for discharge through a Roots blower, while it is too cool to give efficient draft in a chimney. At this temperature the ratio of irretrievable loss becomes one-fourth as much as at 300 degrees above outside air, say, for double supply of air (100 per cent. surplus) 2.97 per cent. I have set the several ratios in an additional column at the right-hand of Table II., column 8. Taking now the ratios of loss, with 100 per cent. surplus air, from Table II., and subtracting from each one this final loss, we have:

TABLE III.—Ratio, per cent., of saving to be effected by O. Marland's smoke-cooling air-heater, at 100 per cent. surplus air-supply.

Temperatures of Gases of Escaping from Boiler above External Air.							
	300°	400°	500°	600°	700°	800°	
1.	2.	3.	4.	5.	6.	7.	
First loss .....	11.86	15.81	19.77	23.72	27.67	31.63	
Final loss .....	2.97	2.97	2.97	2.97	2.97	2.97	
Actual saving....	8.89	12.84	16.80	20.75	24.70	28.66	

water of 60 degrees to steam of 324 degrees (80 pounds steam-gauge), this apparatus should be able to bring all good boilers, with whatever excess of air, or at whatever (reasonable) degree of heat, the gases were allowed to escape from the boiler. Not only will this apparatus restore to the furnace a large part—from four-fifths to eight-ninths of the heat otherwise inevitably lost—not only will it serve as a "heat-trap" to arrest and restore the loss otherwise inevitable by admission of cold air at the doors while firing and clearing out fires, and by the neglect or unskillfulness of firemen—it will also, I have no doubt, increase the rapidity of combustion, and so enable complete combustion to be carried on with a smaller quantity of air—i. e., with less excess over the quantity chemically necessary.

[We are sorry that we cannot give Mr. Hoadley's pamphlet in full, as the reasoning is consecutive and clear, and much is lost by any attempt at condensation. The following are the concluding remarks:] There can be no doubt that the heat to be returned to the furnace would several times exceed that necessary to make the power required to drive the exhausting fan, to the operation of which the final temperature of

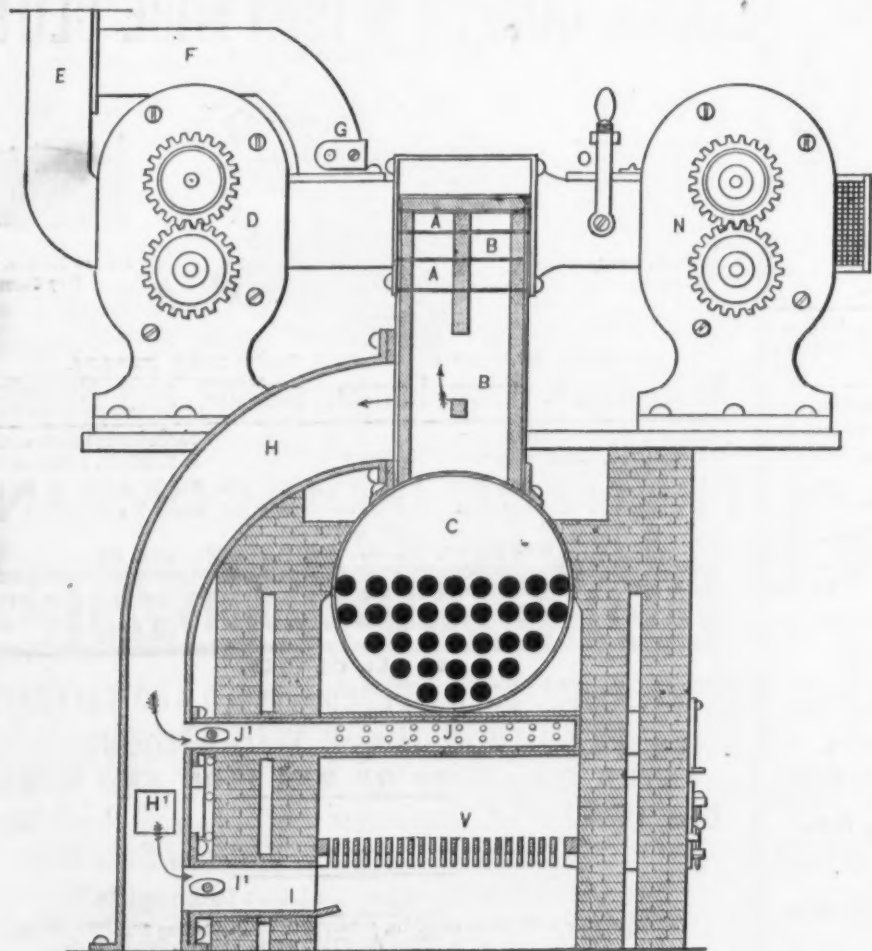


Fig. 1.

(Similar Letters Refer to Similar Parts in Each Figure.)

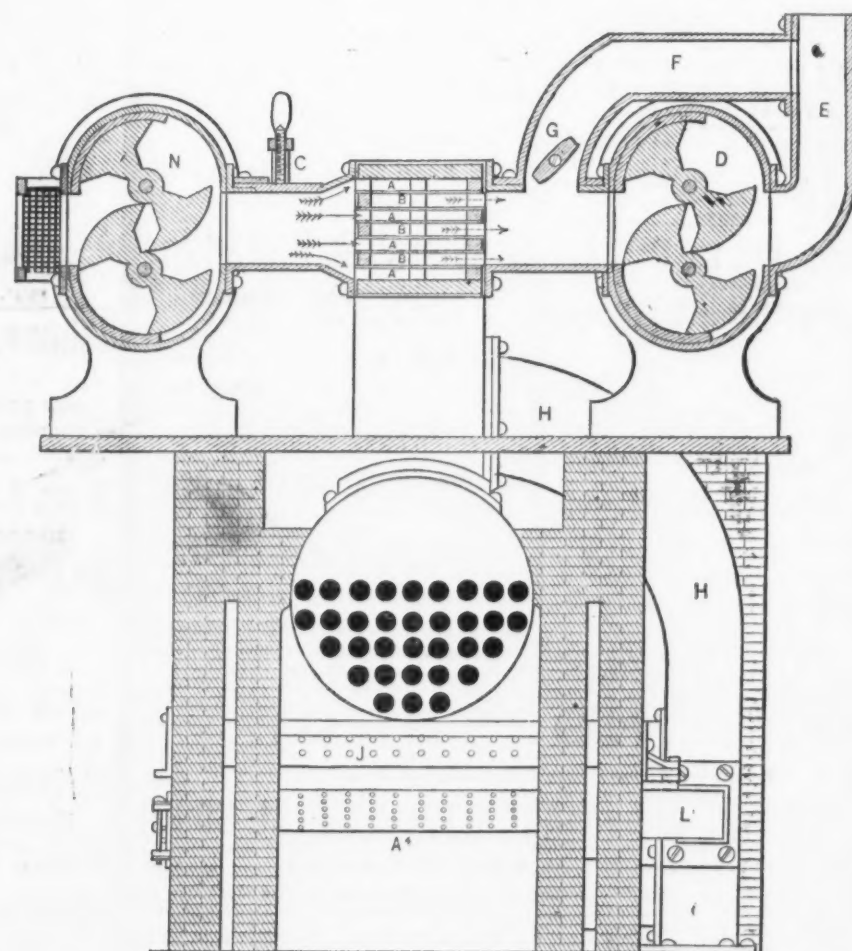


Fig. 2.

## MARLAND'S IMPROVEMENTS FOR UTILIZING THE HEAT OF BOILER FURNACES.

force the air into the furnace, and D to exhaust it and force it out of the pipe. In Fig. 2 a section of the blower is shown. Here the arrows indicate the course of the air. Entering the blower N, it passes into the tubes A, and turning at right angles is conducted along the whole length of the boiler, separated from the hot-air currents by thin partitions, which divide the spaces A A from B B. It then passes down the tubes H H and into the furnace, from which, after passing through the fire and the tubes, it is exhausted by the blower D and discharged into the air. When the exhaust blower is not running, the valve G is opened and the gases escape by the passage T. Two blowers are not necessary, D being in many cases ample for the purpose, according to the ideas of the inventor. Fig. 3 (see page 3), the longitudinal section, shows more clearly the relationships of the various parts, especially the passages A and B, in which the gases travel in opposite directions, separated only by the metal partitions. A and A' are bridge walls, F and I the passages through which the air enters, and C the "front connection" by which the air is conducted to the exhaust fan.

Mr. John C. Hoadley, the well-known engineer, has recently published a pamphlet upon the subject of the combustion of fuel and the advantages likely to accrue from the use of this improved apparatus. Starting with the constitution of coal, we find anthracite, though very pure carbon, is reduced in value, from various causes, to about 12,000 thermal units per pound. Could all of

admission of a greater amount of air than can be used for consuming the coal. On page 3 we give these tables, and quote below at length from Mr. Hoadley's pamphlet some of the conclusions which he deduces from them: Doubts may be entertained as to so large an excess of air as 150 per cent. occurring in practice. In fact, it is very common. It is not easy to carry on complete combustion by means of natural draft with less than 100 per cent excess—i. e., double the necessary quantity, reckoned as it usually is at 12 pounds of gases absolutely necessary per pound of coal, as if coal were entirely composed of carbon. Now, 25 pounds of gaseous products for the combustion of one pound of anthracite coal, containing only five-sixths of a pound of carbon, and producing, with no excess of air, only 10.5 pounds of gases, is equal to (25-10.5 = 14.5) 138 per cent. surplus air. Experiments to ascertain the composition, volume and temperature of the gases from 17 boilers, burning good anthracite coal at a known rate, with great care, and under most favorable conditions of draft, grate-area, rate of combustion, area of heating surface, and general management, gave, by analysis, carbon-dioxide (no mon-oxide) nitrogen, and free atmospheric air—the latter being one-half of the whole. A check upon the accuracy of these results was found in the temperature of the furnace. This should be, with double supply of air, about 2600° F. It was found to be a little less, about 2400 degrees. In my opinion, it is understating

seems to me excessive; but 75 degrees is probably quite within the mark. Observation of a pyrometer in the smoke box of a return-tubular boiler at all stages of the fire has satisfied me that in excellent boilers, well fired, having a ratio of heating surface to grate area as large as 36, the temperature of the escaping gases rarely, if ever, falls lower than 75 degrees above the temperature due to the steam pressure, except when the fire doors are open, and there is great and unusual excess of air admitted. Adding 75 degrees to the temperature corresponding to 80 pounds steam-gauge pressure, 324 degrees, we have, say, 400 degrees as the lowest practicable temperature of escaping gases. This will be confirmed by the best practice under favorable conditions; and the actual temperature will range through a low average of 500 degrees and a high average of 600 degrees up to 800 degrees or over; in some extreme cases going up to high incandescence, or over 1000 degrees.

It appears, then, that under ordinary circumstances from 16 to 20 per cent. of the total quantity of heat produced by the combustion of anthracite coal, can certainly be saved and returned to the furnace by the Marland apparatus, judiciously arranged and proportioned; that in no circumstances can such saving fall so low as 10 per cent., and that it will often be 25 per cent., and may, in extreme cases, reach 30 per cent. The rate of evaporation per pound of coal from feed water at 60°, under 80 pounds steam gauge pressure, say 324°, is, certainly, in general, below 8 pounds. Indeed, 8 pounds of dry steam is a fair result, 8.15 pounds a good result, 8.5 pounds very good, and 9.0 pounds about the best usually attainable, being rather over 10,000 thermal units, which corresponds to 60 per cent. of the full calorific power of carbon, and is, for coal of five-sixths carbon, a high result. If we take, as we properly may, 8.5 pounds of water evaporated into dry steam of 80 pounds steam gauge pressure from feed water of 60°, with 1 pound of anthracite coal of five-sixths carbon, as corresponding to an air supply of 100 per cent. surplus, and escaping temperature of gases of 400° above external air, the apparatus, in effecting a saving of 12.84 per cent., would add to the evaporation, say, 12.84 per cent of 10.8 = 1.4 pounds, making (8.5+1.4) 9.9 pounds; 10.8 pounds being the full evaporating power of such coal under the given conditions. To about this degree of efficiency, or to nearly or quite 10 pounds of water per pound of five-sixths coal from



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The following are tables I and II, referred  
to on the first page. They convey in a clear  
manner an idea of the relations of the  
losses to each other and to their causes:

TABLE I.—Gaseous products of the combustion  
of anthracite coal, and the loss caused by the  
escape of these gases at several assumed tem-  
peratures, with just sufficient air for perfect  
combustion, and with various degrees of sur-  
plus, 50, 100, 125 and 150 per cent.

Excess of air for combustion of carbon. Per cent. necessary quantity.	Weight of gaseous products of combustion of carbon in one pound of an- thracite coal— 5.6 of coal.	Corresponding wt. of water which could be heated " by cooling these gases 1°.	Thermal units ex- pressed in foot- pounds.	Total for 300° above external air.	Total for 400° above external air.	Total for 500° above external air.
1.	1.50	2.4831	4,911	576,700	768,400	960,500
2.	1.50	2.4831	4,911	576,700	768,400	960,500
3.	1.50	2.4831	4,911	576,700	768,400	960,500
4.	1.50	2.4831	4,911	576,700	768,400	960,500
5.	1.50	2.4831	4,911	576,700	768,400	960,500
6.	1.50	2.4831	4,911	576,700	768,400	960,500
7.	1.50	2.4831	4,911	576,700	768,400	960,500
8.	1.50	2.4831	4,911	576,700	768,400	960,500
9.	1.50	2.4831	4,911	576,700	768,400	960,500
10.	1.50	2.4831	4,911	576,700	768,400	960,500
11.	1.50	2.4831	4,911	576,700	768,400	960,500
12.	1.50	2.4831	4,911	576,700	768,400	960,500
13.	1.50	2.4831	4,911	576,700	768,400	960,500
14.	1.50	2.4831	4,911	576,700	768,400	960,500
15.	1.50	2.4831	4,911	576,700	768,400	960,500
16.	1.50	2.4831	4,911	576,700	768,400	960,500
17.	1.50	2.4831	4,911	576,700	768,400	960,500
18.	1.50	2.4831	4,911	576,700	768,400	960,500
19.	1.50	2.4831	4,911	576,700	768,400	960,500
20.	1.50	2.4831	4,911	576,700	768,400	960,500
21.	1.50	2.4831	4,911	576,700	768,400	960,500
22.	1.50	2.4831	4,911	576,700	768,400	960,500
23.	1.50	2.4831	4,911	576,700	768,400	960,500
24.	1.50	2.4831	4,911	576,700	768,400	960,500
25.	1.50	2.4831	4,911	576,700	768,400	960,500
26.	1.50	2.4831	4,911	576,700	768,400	960,500
27.	1.50	2.4831	4,911	576,700	768,400	960,500
28.	1.50	2.4831	4,911	576,700	768,400	960,500
29.	1.50	2.4831	4,911	576,700	768,400	960,500
30.	1.50	2.4831	4,911	576,700	768,400	960,500
31.	1.50	2.4831	4,911	576,700	768,400	960,500
32.	1.50	2.4831	4,911	576,700	768,400	960,500
33.	1.50	2.4831	4,911	576,700	768,400	960,500
34.	1.50	2.4831	4,911	576,700	768,400	960,500
35.	1.50	2.4831	4,911	576,700	768,400	960,500
36.	1.50	2.4831	4,911	576,700	768,400	960,500
37.	1.50	2.4831	4,911	576,700	768,400	960,500
38.	1.50	2.4831	4,911	576,700	768,400	960,500
39.	1.50	2.4831	4,911	576,700	768,400	960,500
40.	1.50	2.4831	4,911	576,700	768,400	960,500
41.	1.50	2.4831	4,911	576,700	768,400	960,500
42.	1.50	2.4831	4,911	576,700	768,400	960,500
43.	1.50	2.4831	4,911	576,700	768,400	960,500
44.	1.50	2.4831	4,911	576,700	768,400	960,500
45.	1.50	2.4831	4,911	576,700	768,400	960,500
46.	1.50	2.4831	4,911	576,700	768,400	960,500
47.	1.50	2.4831	4,911	576,700	768,400	960,500
48.	1.50	2.4831	4,911	576,700	768,400	960,500
49.	1.50	2.4831	4,911	576,700	768,400	960,500
50.	1.50	2.4831	4,911	576,700	768,400	960,500

I have made the divisions above mentioned  
for various temperatures, ranging from 300 to

all, 600 feet; beam, 52 feet; depth of hold,  
37 feet. The breadth and depth give the  
ship unusual stability at sea and decrease  
the resistance, giving her a great advantage  
in speed. The immense hull is divided into  
ten water-tight compartments, and besides,  
each of the boiler rooms and the coal bunk-  
ers, which are built on each side of the  
boilers as a protection in case of collision,  
are also water-tight. Every mechanical  
contrivance that can make great strength  
possible in the building of her hull has been  
used, and no expense has been spared to  
make her not only the largest, but the  
soundest and strongest vessel afloat. The  
gross tonnage of the City of Rome is 8000  
tons, of which about 2000 tons is taken up  
for engine and coal room. For safety, in the  
event of her coming into collision with an-  
other vessel or stranding on rocks, she has  
collision bulkheads and a double bottom.  
The engines that are to propel this immense  
craft through the water are of the style  
known as the "inverted tandem." They  
consist of three high and three low pressure  
cylinders. Steam is supplied by eight cylind-  
rical tubular boilers, fired from both ends.  
The engines are intended to work up to 8000  
indicated horse-power constantly, but when  
necessary, they can with perfect safety de-  
velop 10,000 horse-power.

New York Trade and Art Schools.

Under a joint arrangement between  
Richard T. Auchmuty and the trustees of  
the Metropolitan Museum of Art, a technical  
school for the industrial education of arti-  
sans in the elements of mechanics and  
design was established in the fall of 1880, in  
a building, specially erected and presented  
by Mr. Auchmuty for the purpose, in First  
avenue, between Sixty-seventh and Sixty-  
eighth streets. Classes were formed for prac-  
tical instruction in drawing and designing,  
decoration in distemper, modeling and carv-

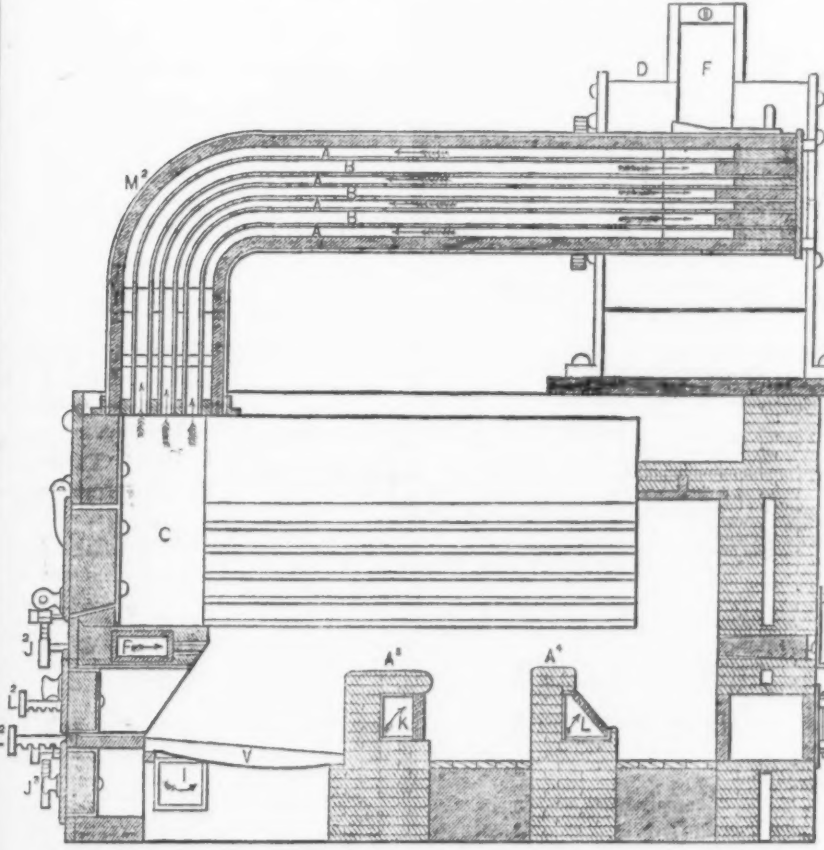


Fig. 3.  
Marland's Improvements for Utilizing the Heat of Boiler Furnaces.

700 degrees above the external air, and have  
tabulated the result in the following table:

TABLE II.—Rate per cent. of the heat carried off  
by the gaseous products of combustion to the  
total calorific power of each pound of coal,  
with various degrees of excess of air, and at  
various temperatures of the escaping gases  
above the external air.

Excess of air above that chemically ne- cessary for com- bustion of carbon, per cent. of the necessary quan- tity.	Ratio of heat to total calorific power—Per cent.	Temperature above external air.
1.	1.50	300°
2.	1.50	400°
3.	1.50	500°
4.	1.50	600°
5.	1.50	700°
6.	1.50	800°
7.	1.50	900°
8.	1.50	1000°
9.	1.50	1100°
10.	1.50	1200°
11.	1.50	1300°
12.	1.50	1400°
13.	1.50	1500°
14.	1.50	1600°
15.	1.50	1700°
16.	1.50	1800°
17.	1.50	1900°
18.	1.50	2000°
19.	1.50	2100°
20.	1.50	2200°
21.	1.50	2300°
22.	1.50	2400°
23.	1.50	2500°
24.	1.50	2600°
25.	1.50	2700°
26.	1.50	2800°
27.	1.50	2900°
28.	1.50	3000°
29.	1.50	3100°
30.	1.50	3200°
31.	1.50	3300°
32.	1.50	3400°
33.	1.50	3500°
34.	1.50	3600°
35.	1.50	3700°
36.	1.50	3800°
37.	1.50	3900°
38.	1.50	4000°
39.	1.50	4100°
40.	1.50	4200°
41.	1.50	4300°
42.	1.50	4400°
43.	1.50	4500°
44.	1.50	4600°
45.	1.50	4700°
46.	1.50	4800°
47.	1.50	4900°
48.	1.50	5000°
49.	1.50	5100°
50.	1.50	5200°

The New Steamer City of Rome.—On  
the 13th proximo the steamer City of Rome,  
the latest addition to the already large fleet  
of the Inman Line of transatlantic steamers,  
will leave Liverpool for this port. Without  
exception, the City of Rome is the largest  
passenger steamer afloat, and with the ex-  
ception of the Great Eastern, is the largest  
vessel afloat. She was built in the yard of  
the Barrow Shipbuilding Company, at  
Barrow-in-Furness, Lancashire, alongside  
the Furness, the last new steamer of the  
Anchor Line. Her dimensions are: Length  
between perpendiculars, 546 feet, and over

ing, carriage drafting and plumbing. There  
were 143 pupils in attendance at the school  
last winter. It was open day and evening.  
Lectures were given by specialists in differ-  
ent trades and arts, but a particular feature  
was made of shop instruction by foremen  
and journeymen from different manufactur-  
eries in this city. The membership of the  
different classes was as follows: Drawing  
and design, 31; modeling and carving, 27;  
carriage drafting, 21; decoration in dis-  
temper, 13; plumbing and sanitary engin-  
eering, 50.  
Since the schools were closed last spring,  
a wealthy man of this city has given \$50,000  
to the Metropolitan Museum of Art, to be  
devoted to the advance of art education.  
The art classes will be withdrawn, therefore,  
from the building at Sixty-eighth street and  
will meet at Glass Hall, in Thirty-fourth  
street. The artisan classes will remain as  
heretofore at Sixty-eighth street and be  
known as the New York Trade Schools.  
There will be two schools, practically; one  
for the decorative arts, and the other for the  
trades. The former will be in charge of  
John Buckingham, former manager of the  
schools, and the latter will be under the  
supervision of Charles F. Wingate, who had  
charge last winter of the class in plumbing  
and sanitary engineering.  
The course of instruction for the coming  
year will embrace many new features.  
There is a large and well-appointed work-  
shop, where instruction will be given in the  
manual branches of the trade. Attached to  
this workshop will be a collection of articles  
and materials used in plumbing. It is pro-  
posed to make this collection as complete as  
possible. Professor C. F. Chandler, presi-  
dent of the Board of Health, and Professor  
Egleston, of the School of Mines of Columbia  
College, have volunteered to take part in  
the series of lectures to be given to the  
class. The new plumbers' license law is  
intended to secure a higher order of plum-  
bers for New York and Brooklyn, and if any  
workman feels unable to meet its require-  
ments, he has now a chance to perfect him-  
self at an almost nominal cost. These trade  
schools are not intended to be either a  
charitable or a money making institution,  
the charges being based on the actual cost  
of the instruction given.



<p><b>Iron.</b> NEW YORK.</p> <p><b>OGDEN &amp; WALLACE,</b> 55, 57, 59 &amp; 91 Elm St., New York. <b>Iron and Steel</b> Of every description kept in stock. Agents for Park Brother &amp; Co.'s <b>BLACK DIAMOND STEEL.</b> All sizes of Cast and Machinery Steel constantly on hand.</p> <p><b>PIERSON &amp; CO.,</b> 24 Broadway, New York City. <b>Iron &amp; Steel.</b> <b>COMMON &amp; REFINED IRON,</b> Hoops, Rods, Scrolls, Bands, Ovals, Horse Shoe, Nail Rods, Steel, &amp;c. Orders promptly filled from stock.</p> <p><b>ABEEL BROTHERS,</b> Established 1765 by ABEEL &amp; BYVANCE, <b>Iron Merchants,</b> 190 South Street and 365 Water, N. Y. <b>ULSTER IRON</b> A full assortment of all sizes constantly on hand. Refined Iron, Horse-Shoe Iron, Common Iron, Band, Hoop and Scroll Iron, Sheet Iron, Norway Nail Rods, Cast, Spring and Tire Steel, etc.</p> <p><b>A. R. WHITNEY,</b> Manufacturer of and Dealer in <b>IRON</b> Our specialty is in manufacturing Iron Used in the Con- struction of Fire-Proof Buildings, Bridges, &amp;c. Agent for Carnegie Bros. &amp; Co., Limited, Pittsburgh, Pa., Wrought Iron Beams and Channel Iron. Bay State Iron Co., Boston, Mass., Boiler Plate and Tank Iron. Naylor &amp; Co., Boston, Mass., Homogeneous Steel Plates and Compressed Steel Shaping. Plans and estimates furnished, and contracts made for erecting Iron Structures of every descrip- tion. Books containing cuts of all Iron made sent on application by mail. Sample pieces at office. Please address 55 Hudson Street, New York.</p>	<p><b>Iron.</b> NEW YORK.</p> <p><b>A. B. Warner &amp; Son,</b> <b>IRON MERCHANTS,</b> 28 &amp; 29 West and 52 Washington Sts <b>BOILER PLATE,</b> Boiler Tubes, Angle, Tee &amp; Girder Iron. Boiler and Tank Rivets. Sole Agents for the celebrated "Eureka," Pennocks "Wawasset," Lukens, Brands of Iron. Also all descriptions of Plate, Sheet and Gasometer Iron. Special attention to Locomotive iron. Fire Box Iron a specialty.</p> <p><b>ROME MERCHANT IRON MILLS,</b> ROME, N. Y., Manufacturers of the best grade of Bar Iron, Bands and Fine Hoops. Scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and Horse Shoe Iron. Also from Charcoal Pig a superior quality of Iron branded J. G. All puddled balls re- duced by hammer. Orders may be sent to the Mill or to J. O. CARPENTER, our Agent, at 59 John Street, New York.</p> <p>Several Choice Lots <b>No. 1 SCRAP IRON,</b> In Yard, New York, FOR SALE BY <b>FOX &amp; DRUMMOND,</b> 68 Wall Street, NEW YORK.</p> <p><b>MARSHALL LEFFERTS &amp; CO.,</b> 90 Beekman St., New York City, MANUFACTURER AND DEALER. <b>Galvanized Sheet Iron,</b> 1st and 2d Qualities. Galvanized Wire, Telegraph and Fence; Galvanized Hoop and Band Iron, Galvanized Rod and Bar Iron, Galvanized Nails, Galvanized Chain, Galvanized Iron Pipe.</p> <p><b>CORRUGATED SHEET IRON</b> For Roofing, &amp;c., Galvanized, Plain or Painted. Best Charcoal, Best Refined and Common <b>SHEET IRON.</b> <b>Plate and Tank Iron.</b> C No. 1, C H No. 1, C H No. 1 Flange, Best Flange Best Flange Fire Box, Circles.</p> <p><b>BOILER IRON</b> Stamped and Guaranteed. All descriptions of Iron Work Galvanized or Tinned to order. Price list and quotations sent upon application.</p>	<p><b>Iron.</b> NEW YORK.</p> <p><b>JOHN W. QUINCY &amp; CO.,</b> 98 William Street, New York. Anthracite &amp; Charcoal Pig Irons, Wrought Scrap, Cut Nails, Copper, BLOCK TIN, LEAD, SELLER, ANTIMONY, NICKEL, &amp;c.</p> <p><b>HARRISON &amp; GILLOON</b> <b>IRON AND METAL DEALERS,</b> 550, 560, 562 WATER ST., and 902, 904, 906 CHERRY ST., NEW YORK. Have on hand, and offer for sale, the following: Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Car-Wheels, Axles and Heavy Wrought Iron; also old Copper, Composition, Brass, Lead, Pewter, Zinc, &amp;c.</p> <p><b>OXFORD IRON CO.,</b> (B. G. CLARKE, Receiver.) <b>Cut Nails</b> AND <b>SPIKES.</b> J. S. SCRANTON, Sales Agent, 81, 83 and 85 Washington Street, NEW YORK.</p> <p><b>BURDEN'S</b> <b>HORSE SHOES.</b> "Burden Best" Iron Boiler Rivets. The Burden Iron Company Troy, N. Y.</p> <p><b>EGLESTON BROS. &amp; CO.,</b> 166 South Street, NEW YORK CITY. 267 Front Street, <b>BURDEN'S</b> <b>H. B. &amp; S.</b> AND <b>ULSTER BAR IRON.</b> All sizes and shapes in stock. Also Best Grades of Am. &amp; Eng. Ref'd Iron, Common Iron, &amp;c. Glengarnock and Carnbroe <b>SCOTCH PIG IRON.</b> For spot delivery and for prompt or forward shipments to New York, Boston, Philadelphia, Baltimore or New Orleans. For sale in lots to suit by <b>JAMES LEE &amp; CO.,</b> Sole Agents for the United States, 72 Pine Street, New York.</p>	<p><b>Iron.</b> PITTSBURGH.</p> <p><b>W. D. WOOD &amp; CO.'S</b>  <b>PATENT</b> <b>Planished Sheet Iron.</b> Patented March 14th, 1865; April 8th, 1873; Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876. Guaranteed fully equal in all respects to the <b>IMPORTED RUSSIA IRON,</b> and at a much less price. <b>FOR SALE,</b> by all the principal <b>METAL DEALERS</b> In the Large cities throughout <b>THE UNITED STATES.</b> And at their Office, 111 Water Street, PITTSBURGH, PA.</p> <p><b>C. KANE,</b> OLD RAILS, SCRAP IRON, STEEL, PIC IRON, BLOOMS, AND ORE. PITTSBURGH, PA.</p> <p>WM. REA, Pres't. SAM'L BAILEY, Jr., Sec'y. F. B. LAUBERLIN, Vice-Pres't. W. A. SHAW, Treas.</p> <p><b>UNION STORAGE CO.</b> RECEIVE ON Storage and Issue Warrants ON PIG IRON, BLOOMS, INGOTS, MUCK BAR, RAILS, &amp;c. Correspondence relative to establishment of yards at furnaces solicited. General Office, PITTSBURGH, PA.</p>	<p><b>Iron.</b> PITTSBURGH.</p> <p> <b>STEEL TOE CALKS.</b> Extra Quality Homogeneous Steel <b>BOILER PLATE</b> <b>STEEL PLATES,</b> all descriptions. Cut Nails and Spikes, Plate and Sheet Iron, all descriptions. <b>SHOENBERGER &amp; CO.,</b> Pittsburgh, Pa. <b>KEYSTONE ROLLING MILL, Limited,</b> Manufacturers of <b>IRON,</b> Pittsburgh, - - - Pa. <b>Bonnell, Botsford &amp; Co.,</b> <b>Iron, Nails &amp; Spikes.</b> <b>YOUNGSTOWN, OHIO.</b> <b>MARSHALL IRON CO.,</b> Manufacturers of Best Charcoal Bloom, Best Refined &amp; Common <b>SHEET IRON.</b> Office and Mills, Newport, Delaware.</p>
<p><b>BORDEN &amp; LOVELL,</b> <b>Commission Merchants</b> 70 &amp; 71 West St., New York. Wm. Borden, J. L. N. Lovell, J. Agents for the sale of Fall River Iron Co.'s Nails, Bands, Hoops &amp; Rods. AND Borden Mining Company's Cumberland Coals.</p> <p><b>WILLIAM H. WALLACE &amp; CO.,</b> <b>IRON MERCHANTS</b> Cor. Albany &amp; Washington Sts. NEW YORK CITY. M. H. WALLACE. Wm. HERFMAN. Importer of and Dealer in <b>SCOTCH AND AMERICAN</b> <b>Pig Iron,</b> Wrought &amp; Cast Scrap Iron, <b>OLD METALS.</b> 457 &amp; 459 Water St., 233 &amp; 235 South St., NEW YORK.</p> <p><b>DANIEL F. COONEY,</b> (Late of and successor to Jas. H. Holdane &amp; Co.) 88 Washington St., N. Y. <b>BOILER PLATES &amp; SHEET IRON,</b> LAP-WELDED BOILER FLUES, Boiler Rivets, Angle &amp; T Iron, Cut Nails &amp; Spikes. Agency for Glasgow Iron Co., Jos. L. Bailey &amp; Co., Pine Iron Works, Lebanon Rolling Mills, Chester Pipe and Tube Co., Albany &amp; Rees, Iron &amp; Steel Co., celebrated Boiler Rivets; Homogeneous Steel, Boiler and Fire Box Plates.</p> <p><b>S. CHENEY &amp; SON</b> Manlius, N. Y., <b>Small Gray Iron Castings.</b> We warrant our work for smoothness and finish.</p> <p><b>Powerville Rolling Mill,</b> Manufacturer of <b>HORSE SHOE IRON</b> JOHN LEONARD, 450 West St., N. Y.</p>	<p><b>JAMES WILLIAMSON &amp; CO.,</b> SCOTCH AND AMERICAN <b>PIG IRON,</b> No. 69 Wall St., New York.</p> <p><b>ULSTER IRON WORKS.</b> 90 Broadway, New York.</p> <p><b>Tuckerman, Mulligan &amp; Co</b> <b>CARMICHAEL &amp; EMMENS</b> 130, 132 &amp; 134 Cedar St., New York. DEALERS IN <b>IRON AND STEEL BOILER PLATE.</b> Lap-Welded Boiler Tubes, &amp;c., &amp;c. Agent for Old celebrated Cast Steel Boiler Plates, The Coatesville Iron Co., Pottstown Iron Co., The Laurel Rolling Mills, and Union Tube Works; Wrought Iron Beams, Angles, Tees, Rivets, &amp;c.</p> <p><b>HUGH W. ADAMS &amp; CO.,</b> IMPORTERS OF <b>SCOTCH AND ENGLISH IRONS,</b> Agents for American Charcoal and Anthracite Furnaces, 56 Pine Street, New York. HUGH W. ADAMS. DANIEL L. CORRIE. Duty paid or in bond.</p> <p><b>DANIEL W. RICHARDS &amp; CO.,</b> FOREIGN AND DOMESTIC <b>SCRAP IRON, STEEL, RAILS AND METALS,</b> Yards and Office, 88 to 96 Mangin St., NEW YORK. DANIEL W. RICHARDS. MORTON B. SMITH.</p> <p><b>PASSAIC ROLLING MILL CO.,</b> Manufacture and have always in stock <b>ROLLED IRON BEAMS,</b> Channels, Angles, Tees, Merchant Bars, Riveted Work, For- gings, Eye Bars, &amp;c. PATERSON, N. J. Room 45, Astor House, New York.</p> <p><b>CUT NAILS</b> Hot Pressed Nuts, Bolts, Washers, &amp;c. <b>FULLER BROTHERS &amp; CO.,</b> 139 Greenwich Street, New York.</p>	<p><b>DESPARD BROTHERS,</b> 60 Wall St., New York. P. O. Box 764. Importers of New and Old Rails, Steel Blooms, <b>SCRAP IRON, &amp;c.</b> Duty paid or in bond.</p> <p><b>W. S. MIDDLETON,</b> Broker in Machinery &amp; Iron Agent for FORSTER'S CRUSHER &amp; PULVERIZER, The best in market. W. S. MIDDLETON, 52 John St., N. Y.</p> <p><b>S. A. LISSBERGER,</b> <b>IRON &amp; METAL DEALER,</b> 509, 511 and 519 to 529 East 19th St., New York, have on hand, and offer for sale, the following: Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Car Wheels, Axles and Heavy Wrought Iron; also old Copper, Composi- tion, Brass, Lead, Pewter, Zinc, &amp;c.</p> <p><b>WIRE RODS.</b> BUYERS OF <b>ENGLISH IRON AND STEEL RODS</b> are invited to communicate with the undersigned, manufacturers' agents. <b>A. C. LESLIE &amp; CO.,</b> Montreal.</p>	<p><b>ZUC &amp; CO.,</b> Manufacturers of the Celebrated <b>Sable Nails</b> Office and Works, <b>PITTSBURGH, PA.</b></p> <p><b>LEECHBURG IRON WORKS.</b> <b>KIRKPATRICK &amp; CO.,</b> Manufacturers of all grades of <b>FINE SHEET IRONS,</b> (Refined, Cold Rolled, Show Card, Stamping, Tea Tray, Polished, Shovel, Ferrule Iron, &amp;c.) <b>NATURAL GAS USED AS FUEL.</b> OFFICE, No. 143 First Ave., Pittsburgh, Pa. WORKS, Leechburg, Pa.</p> <p><b>W. S. MIDDLETON,</b> Broker in Machinery &amp; Iron Agent for FORSTER'S CRUSHER &amp; PULVERIZER, The best in market. W. S. MIDDLETON, 52 John St., N. Y.</p> <p><b>S. A. 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Front Street.</p> <p><b>CORRUGATED AND CRIMPED IRON</b> <b>ROOFING &amp; SIDING,</b> Iron Buildings, Roofs Shutters, Doors, Cornices Skylights, Bridges, &amp;c. <b>MOSELEY IRON BRIDGE AND ROOF CO.,</b> 5 Day Street, New York.</p> <p><b>FOR SALE,</b> At New England Machinery Depot, 308 North Third St., Philadelphia, Pa. Horizontal, Vertical and Locomotive Tubular Boiler, from 3 to 60 H. P., in stock and larger to order. Engines all sizes. Pumps, Heaters, Injec- tors, steam and hand Brick and Mortar Hoists. Boiler Test Pumps. The new Gravity Coffee Roaster. All of the above constantly kept in stock. Send for circular and price list.</p>	



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410 Walnut Street, PHILADELPHIA.  
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**STRAIGHT AND CURVED TO TEMPLATE,**  
Largely used in the construction of Iron Vessels, Buildings and Bridges.  
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and all kinds of Iron Framing used in the construction of Fire Proof Buildings,  
**PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,**  
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**SHOE.**  
**SHOE.**

**SHOE.**

**SHOE.**

**SHOE.**

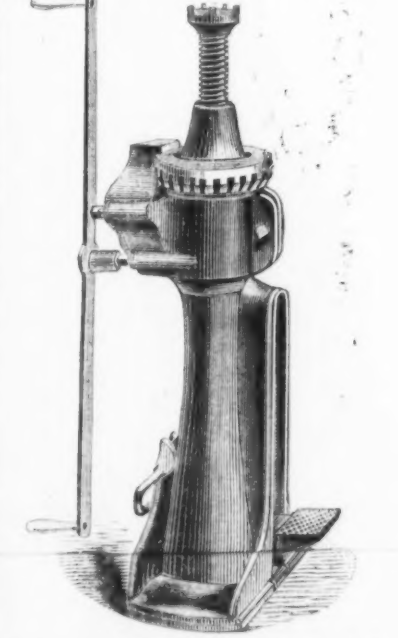
**SHOE.**

**SHOE.**

**SHOE.**

**SHOE.**

**New Form of Screw Jack.**  
The accompanying illustration represents a new form of screw jack invented by Mr. Frederick Tischer, for raising heavy weights. It is of the class known as claw or top lifting, the heavy claw enabling it to lift from the bottom as well as the top. The common screw jack has some very desirable features as a means of lifting, but there are many disadvantages which, when applied to very heavy work, makes it almost useless. In this new jack the inventor seems to have done away with all these objectionable features, and to have produced a jack of very great power and utility. That shown in the cut is intended to lift 15 tons, and weighs about 150 pounds. The smallest size, or five-ton jack, weighs 60 pounds. These are about the same weights, we believe, as ordinary jacks of the same power.  
The jack consists of a long and carefully cut steel screw, working in a deep bronze nut. This nut rests upon a series of conical rollers having journals, by which they are held in position by a traveling plate. The journals have no work to do other than to hold the rolls in place. The top of the head and bottom of the nut are both carefully turned, to give an accurate bearing between the rolls and the bearing surfaces. This makes the screw work easily, even when the full load is on it.  
The nut has a bevel gear cut on its lower edge, which gives means for driving it. This is done by two cog wheels. The upper of these wheels is twice as large as the lower, and as both of them have projecting hubs or shafts which are fitted to take the handle, it will be seen that the jack has two speeds, which is very convenient, enabling the screw to be run in and out rapidly under light loads, and at the same time furnishing



An Improved Form of Screw Jack for both Light and Heavy Work.

great power when heavy work is to be done, simply by changing the handle to the lower shaft. It is represented in this position in the cut.  
The box or head containing the gearing is held in position by a clamp, which may be loosened and the head swung into any convenient position—no small advantage in some cases, as it enables the handle to be got out of the way of projections and the like, which often interfere with the working of fixed heads. Instead of the revolving handle, as shown in the cut, a ratchet handle may be put on, which, in combination with the revolving head, may be worked at any angle, horizontal or vertical, and in a very confined space.  
The screw jack holds its load at any point at which it may be left without any sinking down, while, with the handle as shown, but placed upon the upper stud, the weight can be run down rapidly. For lighter work and for jacks not needed for low work, other styles are made without the claw, which are cheaper. The great reduction in friction obtained by the use of the improved form of nut and gearing, has greatly increased the power of this jack, while the large nut and its careful fitting will no doubt reduce the wear to a minimum. Messrs. Geo. A. Ohl & Co., 212 to 218 Passaic avenue, East Newark, N. J., are the sole manufacturers.

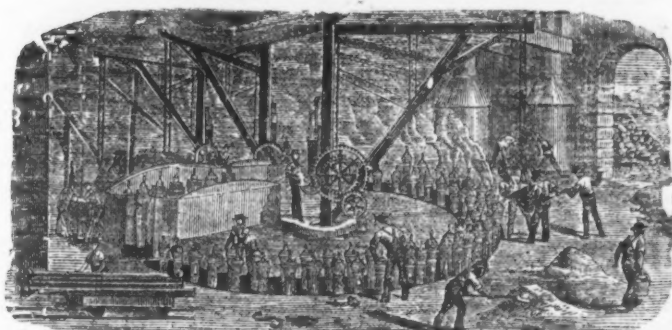
**Imported Spanish Iron Ore.**—The Baltimore American says: There is great dissatisfaction expressed here because of the decision rendered by the Treasury Department, in reference to the manner of invoicing the Spanish iron ore imported to this country. It is said that the decision is obscure, it being impossible for either the collector of customs or the importers to conform therewith. According to this decision, the collector would be compelled, in order to insure himself against loss, to insist on a forfeit being deposited until the analysis of the iron is completed and it is proven that the amount invoiced does not show an undervaluation of 10 per cent. The collector, in his letter to the department, tried to have the latter onerous tax of 20 per cent. penal tax removed, it being impossible to judge the exact quantity of iron contained in the ore, but according to the decision the law is made even more binding than heretofore. Collector Thomas will go to Washington some time during the coming week to see whether it is possible to have the decision modified.

The metal working industries of San Francisco are making good progress. At the recent exhibition of the Mechanics' Fair there was a creditable display of brass castings, and of every description of wire which is manufactured in that city, to the value of \$250,000 per annum. The new wire cable, made for the Geary street road, measures 16,000 feet, and is said to be the longest piece of cable ever made or laid in that city.



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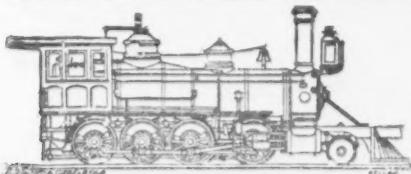
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cars and draw additional cars. Circulars with full particulars supplied.

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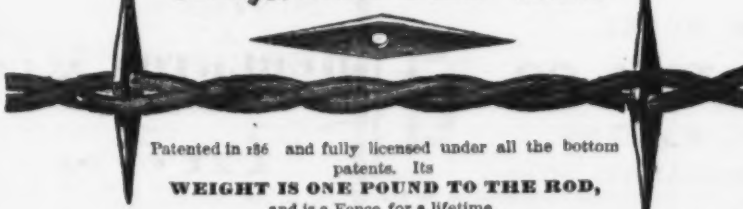
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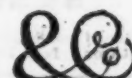
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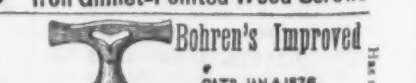
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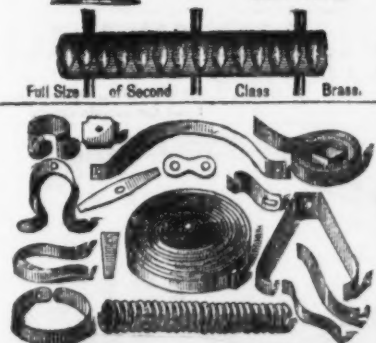


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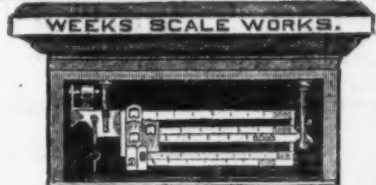
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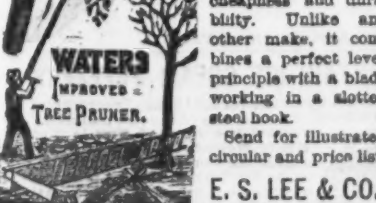
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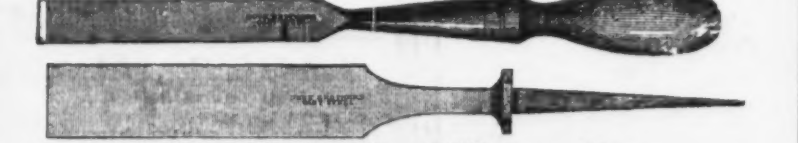
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Protoxide of Iron.....	8.3
Manganese Oxide.....	.09
Alumina.....	4.43
Lime.....	1.59
Magnesia.....	1.57
Silica.....	14.89
Phosphoric Acid.....	.37
Sulphur.....	.42
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Total.....	99.44

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Brewster, Putnam County, N. Y.

**Mechanical Applications of Electricity.**

The addresses of the presidents of the  
various sections of the "British Associa-  
tion," as it is familiarly called, have most of  
them been of unusual interest this year.  
The president of Section G takes up various  
subjects connected with the production of  
power, and discusses them at some length.  
The most interesting portion, perhaps, is  
that relating to the future uses of electricity  
in connection with the production and appli-  
cation of power. As he very happily says,  
many people look upon electricity as a panacea  
for all mechanical deficiencies. He says  
there is certainly some excuse for those who  
are not well informed upon the subject fall-  
ing into an error of this kind, especially  
when they consider the wonderful advances  
which have recently been made in electric  
lighting, &c.

The president then goes on to say: The  
difference between heat and electricity in  
their modes of mechanical action is very  
wide. Heat acts by expansion of volume,  
which we know to be a necessarily wasteful  
principle, while electricity operates by at-  
traction and repulsion, and thus produces  
motion in a manner which is subject to no  
greater loss of effect than attends the mo-  
tive action of gravity, as exemplified in the  
ponderable application of falling water in  
hydraulic machines. If, then, we could pro-  
duce electricity with the same facility and  
economy as heat, the gain would be enor-  
mous; but this—as yet, at least—we cannot  
do. At present by far the cheapest method  
of generating electricity is by the dynamic  
process. Instead of beginning with electri-  
city to produce power, we begin with power  
to produce electricity. As a secondary mo-  
tor, an electric engine may, and assuredly  
will, play an important part in future appli-  
cations of power, but our present inquiry  
relates to a primary, and not a secondary,  
employment of electricity. Thus we are  
brought to the question, From what source,  
other than mechanical action, can we hope to  
obtain a supply of electricity sufficiently cheap  
and abundant to enable it to take the place  
of heat as a motive energy? It is commonly  
said that we know so little of the nature of  
electricity that it is impossible to set bounds  
to the means of obtaining it, but ignorance  
is at least as liable to mislead in the direc-  
tion of exaggerated expectation as in that  
of incredulity. It may be freely admitted  
that the nature of electricity is much less  
understood than that of heat, but we know  
that the two are very nearly allied. The  
doctrine that heat consists of internal mo-  
tion of molecules, may be accepted with al-  
most absolute certainty of its truth. The old  
idea of heat being a separate entity is no  
longer held, except by those who prefer the  
fallacious evidence of their senses to the  
demonstrations of science. So also the idea  
of electricity having a separate existence  
from tangible matter must be discarded, and  
we are justified in concluding that it is  
merely a strained or tensional condition of  
the molecules of matter. Although electri-  
city is more prone to pass into heat than  
heat into electricity, yet we know that they  
are mutually convertible. The fact that they  
scarcely remind you of each other, and that  
magnificent generalization of modern times,  
so pregnant with great consequences, and  
for which we are indebted to many illustri-  
ous investigators, we now know that heat,  
electricity, and mechanical action, are all  
equivalent and transposable forms of energy,  
of which motion is the essence.

To take a cursory view of our available  
sources of energy, we have, firstly, the  
direct heating power of the sun's rays,  
which, as yet, we have not succeeded in  
applying to motive purposes. Secondly, we  
have water power, wind power and tidal  
power, all depending on influences lying out-  
side of our planet. And, thirdly, we have  
chemical attraction or affinity. Beyond  
these there is nothing worth naming. Of  
the radiant heat of the sun I shall have to  
speak hereafter, and bearing in mind that  
we are in search of motive power, we may  
pass over the dynamical agencies comprised  
under the second head, and direct our atten-  
tion to chemical affinity as the sole remain-  
ing source of energy available for our pur-  
pose. At present we derive motive power  
from chemical attraction through the medium  
of heat only, and the question is, Can we  
with advantage draw upon the same source  
through the medium of electricity? The pro-  
cess by which we obtain our supply of heat  
from the exercise of affinity is that of com-  
bustion, in which the substances used con-  
sist, on the one hand, of those we call fuel,  
of which coal is the most important, and on  
the other, of oxygen, which we derive from  
the atmosphere. The oxygen has an im-  
mense advantage over every other available  
substance, in being omnipresent and costless.  
The only money value involved is that of the  
fuel, and in using coal we employ the cheap-  
est oxidizable substance to be found in na-  
ture. Moreover, the weight of coal used in  
the combination is only about one-third of  
the weight in oxygen, so that we only pay  
upon one-fourth of the whole material con-  
sumed. Thus we have conditions of the  
most favorable description for the produc-  
tion of energy, in the form of heat, and if  
we could only use the affinities of the same  
substances with equal facility to evolve  
electric energy instead of heat energy, there  
would be nothing more to desire; but as yet  
there is no appearance of our being able to  
do this. According to our present practice  
we consume zinc, instead of coal, in the vol-  
taic production of electricity, and not only  
is zinc 30 or 40 times dearer than coal, but  
it requires to be used in about sixfold larger  
quantity in order to develop an equal  
amount of energy. Some people are bold  
enough to say that with our present imper-  
fect knowledge of electricity we have no  
right to condemn all plentiful substances,  
other than coal, as impracticable substitutes  
for metallic zinc, but it is manifest that we  
cannot get energy from affinity, where  
affinity has already been satisfied. The  
numerous bodies which constitute the mass  
of our globe, and which we call earths, are  
bodies in this inert condition. They have  
already, by the union of the two elements  
composing them, evolved the energy due to  
combination, and that energy has ages ago  
been dissipated in space in the form of heat,  
never again to be available to us. As well  
might we try to make fire with ashes as to

use such bodies over again as sources of heat  
or electricity. To make them fit for our  
purpose we should first have to annul their  
state of combination, and this would require  
the expenditure of more energy upon them  
than we could derive from their recombi-  
nation.

Water, being oxidized hydrogen, must be  
placed in the same category as the earths.  
In short, the only abundant substances in  
nature possessing strong, unsatisfied affin-  
ities, are those of organic origin, and in the  
absence of coal, which is the accumulated  
product of a past vegetation, our supply of  
such substances would be insignificant. This  
being the case, until a means be found of  
making the combination of coal with oxygen  
directly available for the development of  
electric energy, as it now is of heat energy,  
there seems to be no probability of our ob-  
taining electricity from chemical action at  
such a cost as to supplant heat as a motive  
agent. But while still looking to heat as the  
fountain head of our power, we may very  
possibly learn to transmute it economically  
into the more available form of electricity.  
One method of transformation we already  
possess, and we have every reason to believe  
that there are others yet to be discovered.  
We know that when dissimilar metals are  
joined at opposite ends, and heated at one  
set of junctions while they are cooled at the  
other, part of the heat applied disappears in  
the process, and assumes the form of an  
electric current. Each couple of metals may  
be treated as the cell of a voltaic battery,  
and we may multiply them to any extent,  
and group them in series or in parallel, with  
the same results as are obtained by similar  
combinations of voltaic cells. The electri-  
city so produced we term thermo-electricity,  
and the apparatus by which the current is  
evolved is the thermo-electric battery. At  
present this apparatus is even more wasteful  
of heat than the steam engine; but consid-  
ering the very recent origin of this branch  
of electrical science, and our extremely im-  
perfect knowledge of the actions involved,  
we may reasonably regard the present  
thermo-electric battery as the infant condi-  
tion of a discovery, which, if it follows the  
rule of all previous discoveries in electricity,  
only requires time to develop into great  
practical importance. Now, if we possessed  
an efficient apparatus of this description, we  
could at once apply it to the steam engine  
for the purpose of converting into electric  
energy the heat which now escapes with  
the rejected steam and the gases from the  
fire.

The vice of the steam engine lies in its in-  
ability to utilize heat of comparatively low  
grade, but if we could use up the leavings  
of the steam engine by a supplemental ma-  
chine acting on thermo-electric principles,  
the present excessive waste would be  
avoided. We may even anticipate that in  
the distant future a thermo-electric engine  
may not only be used as an auxiliary, but in  
complete substitution of the steam engine.  
But it is not alone in connection with a bet-  
ter utilization of the heat of combustion that  
thermo-electricity bears so important an  
aspect, for it is only the want of an efficient  
apparatus for converting heat into electricity  
that prevents our using the direct heating  
action of the sun's rays for motive power.  
In our climate, it is true, we shall never be  
able to depend upon sunshine for power, nor  
need we repine on that account so long as we  
have the preserved sunbeams which we  
possess in the condensed and portable form  
of coal; but in regions more favored with  
sun and less provided with coal, the case  
would be different. The actual power of  
the sun's rays is enormous, being computed  
to be equal to melting a crust of ice 103 feet  
thick over the whole earth in a year. With-  
in the tropics it would be a great deal more;  
but a large deduction would everywhere  
have to be made for absorption of heat by  
the atmosphere. Taking all things into  
account, however, we shall not be far from  
the truth in assuming the solar heat, in that  
part of the world, to be capable of melting  
annually, at the surface of the ground, a  
layer of ice 85 feet thick. Now let us see  
what this means in mechanical effect. To  
melt 1 pound of ice requires 142.4 English  
units of heat, which, multiplied by 772, gives  
us 109,932 foot pounds as the mechanical  
equivalent of the heat consumed in melting  
a pound of ice. Hence we find that the  
solar heat operating upon an area of one  
acre in the tropics, and competent to melt  
a layer of ice 85 feet thick in a year, would,  
if fully utilized, exert the amazing power of  
4000 horses acting for nearly nine hours  
every day.

In dealing with the sun's energy we could  
afford to be wasteful. Waste of coal means  
waste of money, and premature exhaustion  
of coal beds, but the sun's heat is poured  
upon the earth in endless profusion—endless  
at all events in a practical sense; for what  
ever anxiety we may feel as to the duration  
of coal, we need have none as to the dura-  
tion of the sun. We have therefore only to  
consider whether we can divert to our use  
so much of the sun's motive energy as will  
repay the cost of the necessary apparatus,  
and whenever such an apparatus is forti-  
comin'g we may expect to bring into subjec-  
tion a very considerable proportion of the  
4000 invisible horses which science tells us  
are to be found within every acre of tropical  
ground. But whatever may be the future  
of electricity as a prime mover, either in a  
dominant or subordinate relation to heat, it  
is certain to be largely used for mechanical  
purposes in a secondary capacity—that is to  
say, as the offspring instead of the parent of  
motive power. The most distinctive charac-  
teristic of electricity is that which we  
express by the word "current," and this  
gives it great value in cases where power is  
required in a transmissible form. The  
term may be objected to as implying a  
motion of translation analogous to the  
flow of a liquid through a pipe, whereas  
the passage of electricity through a conductor  
must be regarded as a wave-like action com-  
municated from particle to particle. In the  
case of a fluid current through a pipe, the  
resistance to the flow increases as the square  
of the velocity, while in the case of an elec-  
tric current, the resistance through a given  
conductor is a constant proportion of the  
energy transmitted. So far, therefore, as  
resistance is concerned, electricity has a  
great advantage over water for the trans-  
mission of power. The cost of the conduc-  
tor will, however, be a grave consideration



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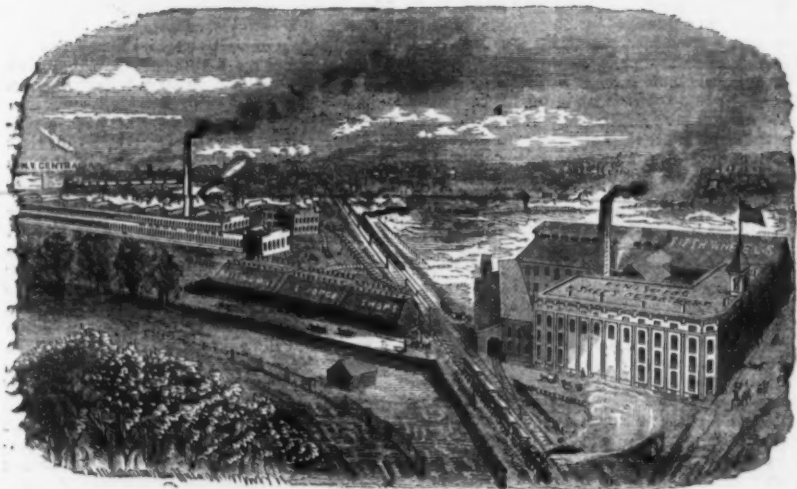
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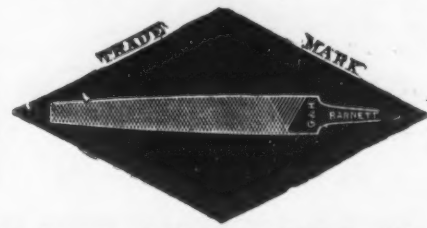
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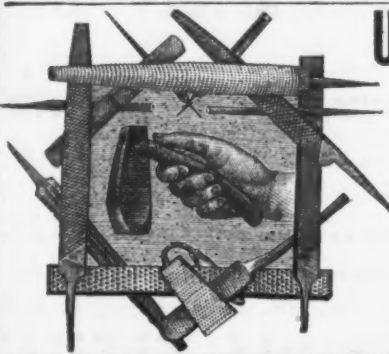
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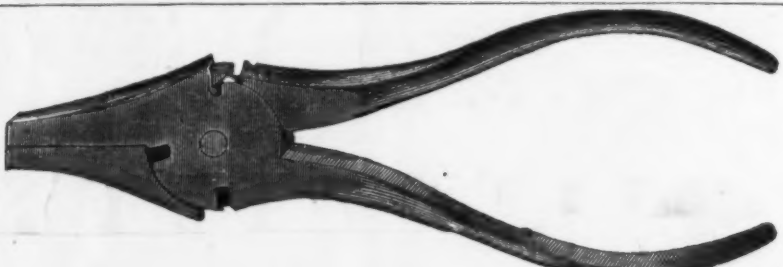
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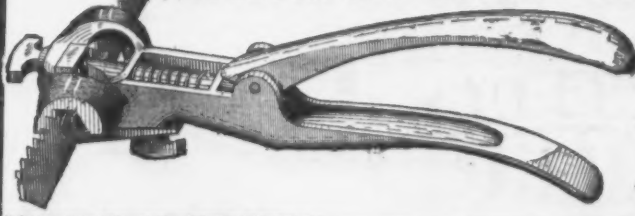
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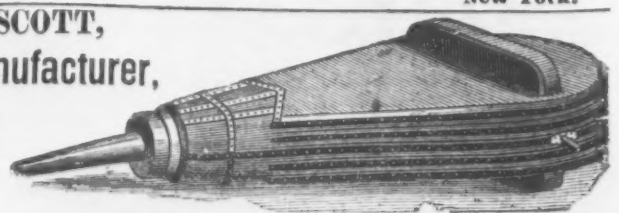
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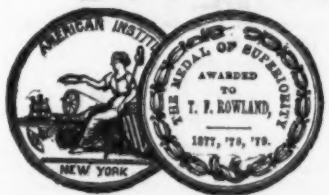
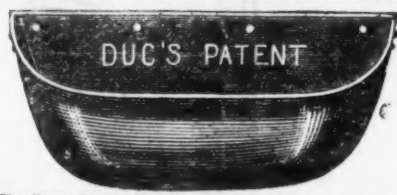
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where the length is great, because its section must be increased in proportion to the length, to keep the resistance the same. It must also be large enough in section to prevent heating, which not only represents loss, but impairs conductivity.

To work advantageously on this system, a high electro-motive force must be used, and this will involve loss by imperfect insulation, increasing in amount with the length of the line. For these reasons there will be a limit to the distance to which electricity may be profitably conveyed, but within that limit there will be wide scope for its employment transmissively. Whenever the time arrives for utilizing the power of great waterfalls, the transmission of power by electricity will become a system of vast importance. Even now small streams of water inconveniently situated for direct application may, by the adoption of this principle, be brought into useful operation. For locomotive purposes also we find the dynamo-electric principle to be available, as instanced in the very interesting example presented in Siemens's electric railway, which has already attained that degree of success which generally fore-shadows an important future. It forms a combined fixed engine and locomotive system of traction, the fixed engine being the generator of the power, and the electric engine representing the locomotive. Steam power may both be transmitted and distributed by the intervention of electricity, but it will labor under great disadvantages when thus applied, until a thoroughly effective electric accumulator be provided capable of giving out electric energy with almost unlimited rapidity. This will be especially the case where the power of the stream is required for electric lighting, which in summer, when the springs are low, will only be required during the brief hours of darkness, while in winter the longer nights will be met by a more abundant supply of water. Even the fitful power of wind, now so little used, will probably acquire new life when aided by a system which will not only collect, but equalize the variable and uncertain power exerted by the air.

In conclusion, I may observe that we can scarcely sufficiently admire the profound investigations which have revealed to us the strict dynamical relation of heat and electricity to outward mechanical motion. Up to this time our knowledge of energy is almost confined to its inorganic aspect. Of its physiological action we remain in deep ignorance, and as we may expect to derive much valuable guidance from a knowledge of nature's methods of dealing with energy in her wondrous mechanisms, it is to be hoped that future research will be directed to the elucidation of that branch of science which as yet has not even a name, but which I may provisionally term "Animal Energetics."

## Fabrication of Superstructure of the East River Bridge.

Looking at the East River Bridge, it seems to the casual observer as though the structure was nearly completed, but, although the main truss is in place, the closed, nothing but floor beams are hanging from the cables by rope suspenders, and generally connected by what are called bridging trusses, described below. The contractors have now delivered almost all the principal floor beams, main truss bottom chords for about 400 feet each way from the towers, three-quarters of total number of bridging trusses, besides some main truss posts, as well as almost the entire lot of under-floor connections for wind bracing. The main floor beams are continuous lattice girders over five openings, and are 32 inches deep and 86 feet long out to out. They are built up of channels and flat bars, each chord consisting of two 6-inch 41-lb. channels back to back (Fig. 1, a), strength-

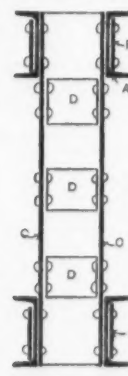


Fig. 1.

oned at the points of greatest momenta by plates  $\frac{1}{2}$  inch thick, fitting the grooves snugly. The diagonals c are composed of flat bars, varying from 5-16ths to  $\frac{1}{2}$  inch in thickness, and from  $3\frac{1}{2}$  to 4 $\frac{1}{2}$  inches in width. When in compression these bars are prevented from buckling by bent plates, d, which are riveted between the flats in any diagonal. This arrangement obviates the use of angles, which are generally very uneconomical, from the lack of space in which to put rivets to connect the different members, also securing the lightest and strongest truss at the expense of cost and increase of shop work. However, as lightness and great strength were primary objects to be attained, this plan was adhered to, although an unusual one, for in most engineering structures economy in first cost is generally considered more important than lightness or even strength. Here the masonry had been laid and cables built, before the present superstructure was designed, and this, as a rule, does not occur—and very fortunately too. This bridge has been so long in construction that the problem has changed considerably from what it was when first conceived, so that originally designed for a highway bridge, it has now been transformed into a railway and highway bridge, all loads having been taken so large as to cover engines up to 40 tons weight.

This would allow any passenger train, even when composed of Pullman sleepers, to run over the bridge. As such service might be required of the structure at some future

day, it was considered advisable to make it amply strong to do such duty. On account of their great length, the floor beams are spliced in the middle, so as to facilitate handling in the shop and field and during erection. They are supported at four points by suspenders, consisting of steel wire ropes when long and rods when short, attached to the cable, and provided with adjusting screws to regulate the height of floor. The main truss bottom chords consist of 9-inch

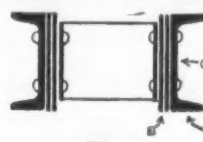


Fig. 2.

channels, a, from 60 to 70 pounds per yard, strengthened by  $\frac{3}{4}$ -inch or  $\frac{1}{2}$ -inch plates, b, 9 inches wide, according to the strains to be carried. Where, however, the thrust due to over-floor stays becomes excessive, the chords are made double (Fig. 3), consisting

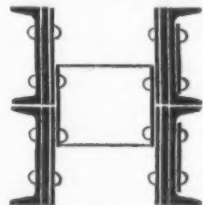


Fig. 3.

of 9-inch channels riveted flange to flange, and also strengthened by plates. This is, of course, an unusual and not a very good manner of building up a chord, but as it was a consideration to limit the number of shapes to be rolled, this method was adopted to avoid rolling a 15-inch, or even larger sizes of channels.

At distances  $7\frac{1}{2}$  feet apart the chords are strengthened by a plate, to make up for section lost by cutting away material for pin-hole, and also to obtain ample bearing surface for the pins. Where these chords run through the towers, it became necessary to reverse the channels (Fig. 4), which touched

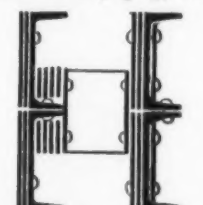


Fig. 4.

the masonry, turning the flanges inward in order to economize space. By this means some 8 inches were gained in the width of carriageways. As the rule, these chords are divided into sections 30 feet in length, to be spliced in the field. This length was adopted to avoid rolling very long channels. Subsequent to the completion of the bridge, it was found that there was no difficulty in rolling much longer pieces, and greater length of chords would have saved considerable labor in construction, as well as in the shop, although handling would have been somewhat more expensive.

The reason why the bottom chords are not composed of eye-bars, as in truss bridges generally, is that the over-floor stay system brings heavy compressive strains on the chords to which they are attached. So far as the system of stays extends, the bridge may be considered as a cantilever, balanced, on account of symmetry of structure, on both sides of the towers.

The bridging trusses, Fig. 5, take the place of stringers in other bridges, giving a middle support to the intermediate floor beams, and

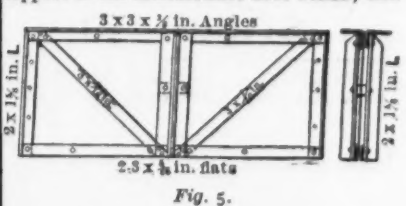
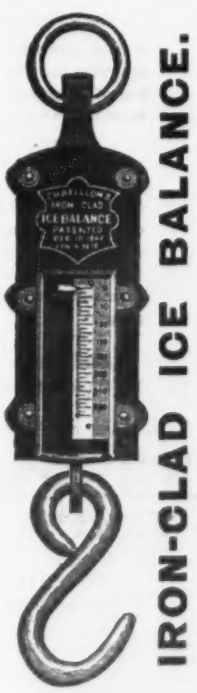


Fig. 5.

are small inverted king-post trusses, 7 feet long, built up of 3 x 3 x  $\frac{1}{2}$  and 2 x 1 $\frac{1}{2}$  and 9-32ds, 3 x 9-16ths and 3 x 5-16ths flat bars, spanning the space between principal floor beams, to which they are riveted at each end. There are six lines of these trusses running the whole length of the bridge, placed centrally one under each line of vehicles and cars.

The truss posts are composed of two 6-inch, 30-pound channels, connected by lattices inclined about 45 degrees, but these differ from posts in almost all other bridges, in that the channels are turned flange to flange, so as to obtain the greatest strength with least width of post, without cutting away the flanges at top and bottom where they enter and pass between the chord channels. Where the truss diagonals pass through these posts the lattices are omitted, so as to leave an opening about 17 inches long at the weakest point of the post, where the lattice connection ought to be strongest. The under-floor connections for wind bracing, are steel bars 7 inches wide, varying from 9-16ths to 1 inch in thickness, with eyes at either one or both ends, bent in the required direction; and are secured to the ends of the bottom chords of either two or three floor-beams, according as they connect with the under-floor diagonals or stays. The under-floor stays are ropes connecting the floor beams with the towers and anchorages, while the diagonals are those crossing ten panels, and from one side of the bridge to the other connecting with the bars that have an eye at each end.

The material used in this work is steel throughout. It is made by the Cambria Iron Co., of Johnstown, Pa., by the Bessemer process. Every blow is subjected to thorough chemical and mechanical tests, and any material found deficient in any respect is rejected for this work. The steel is all superior to specification requirements, generally containing from 0.10 to 0.21 per cent. of carbon, very little manganese, with



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but a trace of phosphorus. The mechanical tests show a tenacity of more than 75,000 pounds per square inch on bars of section 1 inch square, 12 inches long between supports; limit of elasticity about 43,000 pounds, and elongation varying from not less than 15 to more than 20 per cent., with a modulus of elasticity about 28,000,000 pounds. These test pieces are cut from the ingots and then hammered down to the required section. All ingots giving satisfactory results are cut up into blooms large enough for the particular shape and piece to be rolled from it, allowing about 15 per cent. on channels and I-beam blooms for waste in reheating and cropping, but considerably less for flat bars, plates and angles. An attempt was made to roll with but 10 per cent. allowance for waste on channels, but it was found to be too small a margin. The blooms being cut into the proper weight and hammered down to the required dimensions, they are shipped to the Midvale Steel Works, at Nicetown, Philadelphia, Pa., where they are rolled into the required shapes.

Although the material rolled is generally very correct in weight and perfect in section, as well as superior in surface, there are some exceptions which have given considerable trouble. All shapes are, however, far superior to anything ever rolled in iron. All edges are sharp and smooth, and each piece is very uniform in section throughout. Flaws or defects occur very rarely, except at the crop ends, where the material is often "lapped"—i. e., two edges have been rolled together so firmly that the seam between them, although deep and clear, is not easily discernible. Knowing, however, where these defects occur, it is easy to find them, especially as any work on them invariably opens them out.

The principal trouble with the channels and I-beams is their crookedness, and in that respect considerable improvement is possible. Many 9-inch channels had a versed sine of more than 4 inches in 30 feet when standing on edge, and such great curvature would invariably show in the finished work, for cold-straightening was not permitted, although sometimes resorted to. Six-inch channels were worse than the above, but being light in section could easily be straightened, which, however, could not be done with the 6-inch I-beams, being not only crooked, but also having a wind, besides having their tables unsymmetrical to the web, so that one groove is somewhat deeper than the other. All flats and plates are very straight and smooth, and even of wide and very long ones, there were but a few that were badly curved. In every wide plate (16 inches) the thickness varies considerably, sometimes as much as  $\frac{1}{8}$  inch.

From Midvale the steel is shipped to Edge Moor, there to be fabricated into the structure. The first work to be done is to cover the material with a coat of raw linseed oil, primarily to protect it from corrosion, as at the site of the bridge the salt sea air has great effect on all metal work, and must be well guarded against. On account of the alacrity with which everything is done at the bridge shops, the material is often exposed to the influence of the weather for weeks, and even months, before being oiled, so that it is often badly affected by corrosion before being used.

On account of the enormous amount of duplication in a structure of the magnitude of the one before us, each piece of a compound member is made by the hundred or thousand before anything is assembled, and special tools are often needed to perform certain kinds of work. Thus, a compound punch and shear was adapted to form the ends of floor beam lattice bars and bridging truss diagonals (Fig. 6) all in one operation. This put upon the machine the task

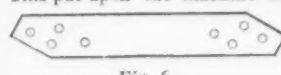


Fig. 6.

of shearing about  $7\frac{1}{2}$  square inches of metal when a  $4 \times \frac{1}{2}$ -inch bar was cut, as here were four  $\frac{3}{4}$ -inch holes to be punched and 8 inches lineal of bar to be sheared. With steel shearing at 70,000 pounds per square inch, this amount of work exceeded the capacity of the machine considerably, and consequently it was continually undergoing repairs when heavy work was done.

The machine, to do this, was a Wm. Sellers 52-inch punch, driving-pulley, 36 inches diameter; width of belt, 7 inches; speed, 135 feet per minute, the die making about four strokes per minute; and at different times the gear-wheel, cam-shaft, and even the cast-iron frame, broke, because of the excessively heavy work put upon it. Considering that such important repairs often required a week's work, besides considerable outlay of money, it is very doubtful whether here was any real economy in using such a special tool, more especially as the work was not more exact than when done in the ordinary manner.

The bent plate separators *d*, Fig. 1, are bent not in a hydraulic press after the rivet holes are punched and the plates cut off to correct length. After a large number of these plates have been made, the lattice bars are riveted to them, and the diagonals are ready to be assembled with the chord channels and plates. This done, the whole beam, being firmly bolted together and having all holes well matched, is taken into the reaming shop, where all rivet holes are reamed out to their proper size. On account of the great injury done to steel by punching, all rivet holes are punched  $\frac{1}{16}$  inch smaller than customary, to be afterward reamed out to exact size. Thus, a hole for an 11-16ths-inch rivet is punched  $\frac{1}{16}$  inch diameter, and reamed out to  $\frac{11}{16}$ -inch diameter. Experiments on a number of  $3\frac{1}{2}$ -inch  $\times$   $\frac{1}{2}$ -inch bars showed that one rivet hole of  $\frac{1}{16}$ -inch diameter, punched and not reamed, reduced the strength of the bars from 51,000 pounds to 55,000 pounds per square inch, with an elastic limit up to 53,000 pounds per square inch. When such bars were punched with  $\frac{1}{16}$ -inch holes and reamed out to  $\frac{11}{16}$ -inch diameter, the reduction of strength was practically nothing. The loss of strength of bars, due to shearing, was never determined experimentally, although the surfaces and edges of the bars showed similar injury to material to that which was incident to punching.

Nothing seems to be so detrimental to a steel structure as carelessness or ignorance

of the manufacturers and workmen. Cold bending, hammering, drifting, and punching and shearing ought to be strongly condemned and not tolerated in any instance, although it is a very difficult matter to break the men of such pernicious habits if they have been accustomed to work on iron, or, still worse, when such work is going through the shop at one and the same time with steel. So far as experience goes, there appears to be no appreciable difference in strength of steel with or across the direction in which the material is rolled, but holes must not be put too close to sheared edges, unless the injured material has been removed.

The primary object of reaming rivet holes is to remove the injured material and restore it to its original condition, but, as it is almost equally important to avoid drifting, the work is first assembled and all parts reamed in their places. This insures smooth holes, although sometimes, when the holes are not well matched, they incline more than 20 degrees to the surface of the piece, thereby making very poor rivets, which give considerable trouble. To prevent shifting of any part having several holes in it, a smooth bolt is passed through the first hole reamed, which remains in place until all the other holes are riveted up. All chords are punched, assembled, reamed and riveted up in a similar manner, and are then complete, except fitting up the ends and boring the pin holes, besides doing all handwork that may be found necessary, and which cannot be done by machinery. Each chord splice was carefully fitted, then reamed in place, and finally riveted up. Although all bottom chords were to have butt-joints, it is the exception to have them thus on account of inferior workmanship; but fortunately the rivet strength is sufficient to transfer all strains, compressive as well as tensile, and does not make butt-joints imperative.

As the bridge floor and trusses are not horizontal, but on a grade over the entire structure, to obtain a sufficient height in the middle of the river without starting too far back with the approaches, all trusses and bridging are necessarily built on a grade, so as to make them rhomboidal instead of rectangular. But as all posts and floor beams must stand vertical, the angles of bridging trusses ought to be very nearly correct; for, if their length is as exact as it appears to be, fillers cannot be inserted to correct the angle, as they would add their own thickness to the length of bridge. In the present condition of the structure, the floor beams are far from vertical, on account of incorrectness of bridgings, and it will be difficult, if not impossible, to correct that defect. Possibly the flexibility of posts and floor beams will allow for this variation.

Bridgings and posts are fabricated in a similar manner to that adopted for floor beams and chords. In the posts which are inserted between the chord channels of floor beams, and also the main truss bottom and top chords, a number of rivets have had to be countersunk flush. As the machine rivets are rarely driven flush, it became necessary to chip the countersunk heads, and when the attempt was made to do so, it was discovered that in numerous instances the steel had been hardened to such an extent that cold chisels could not be tempered sufficiently to more than nick the rivets, and after considerable delay they had to be ground off flush with the adjacent surface. These rivets had probably been hardened by coming in contact with a piece of cold metal, which was placed between them and the riveter jaw to avoid changing the die, or by the chilling effect of water dripping upon them from leaky joints in the hydraulic riveters used at the bridge shops. This same thing sometimes happens with iron rivets, but is of such rare occurrence that no attention is paid to it. When steel is used, however, great care ought to be exercised to avoid the occurrence of hardened rivets, especially where they are countersunk. In rolling channels the same thing was noticed, and occasionally gave considerable trouble when punching was attempted, for with such hard material the punches were generally ruined, although in several instances pieces were broken out of the channels.

In addition to what has been said above about the injurious effect of punching steel, another point ought to be mentioned, as it gives very much trouble in riveting, especially when done by hand. When punching 9-inch channels, in which the lines of rivets were separated  $\frac{1}{2}$  inches, they would become curved across the back to a versed sine as much as 3-16ths inch, making it almost impossible to rivet together two 9-pound 9-inch channels, back to back, in close contact so as to drive good rivets. In 70-pound 9-inch channels this defect was not quite so troublesome, although apparent. An iron channel might easily have been hammered straight, but a steel channel with almost  $\frac{3}{16}$ -inch web was too stiff to be treated in this manner. All material was, however, bent similarly, and this defect is apparently produced by the great local pressure required to punch a hole, and by the insufficient or only partial bearing of the work on the lower die. By observation and measurement of the ring of polished and compressed material around a hole, it was found that the heaviest pressure did not spread more than 3-16ths inch from the edge of the hole. This ring of material was evidently subjected to excessive strain, and the whole of it ought to have been removed by reaming.

The under-floor connections are made by upsetting the eyes on the bars by hydraulic pressure. Great care has to be exercised in handling and forming the bars, as overheating has a most serious effect and must be avoided. In upsetting these bars it was found that the metal would make folds in thickening up, and it required considerable experimenting before any satisfactory eyes were made. Though the eyes now made are strong, they all show signs of defective upsetting and are much larger in section than upset eyes ought to be.

Up to the present time about 2500, out of the 6300 tons of steel in the superstructure, have been fabricated and delivered by the bridge works, which would leave 3800 tons still to come, and working at the rate of 300 tons (average rate of working during past twelve months) per month, it will require not less than 13 months to complete the structure in the shops. As it will take several months to finish the erection, laying of floors and some minor matters, the bridge will hardly be



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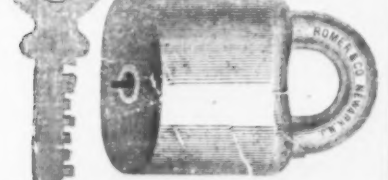
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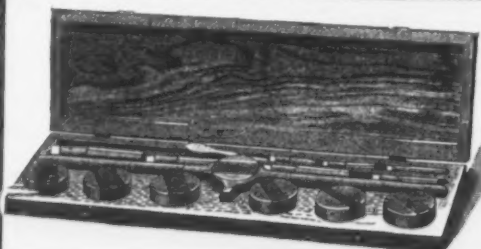


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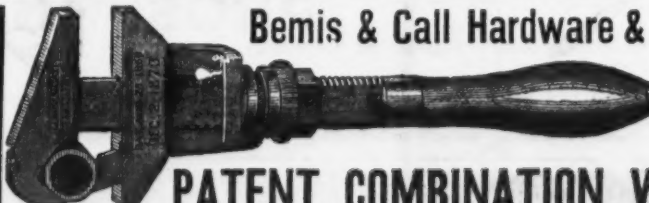
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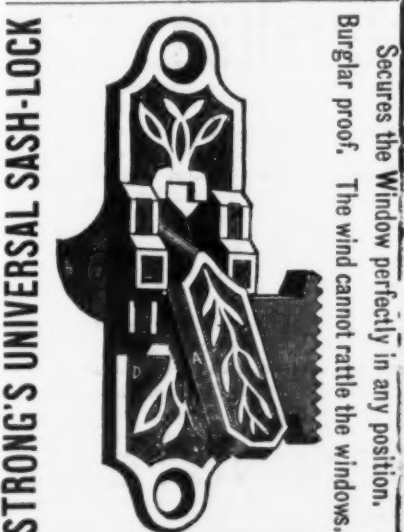
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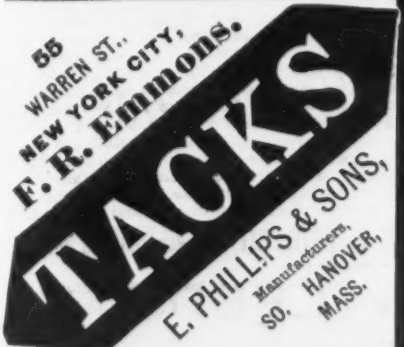
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Is attached to the sash cord, without in the  
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Hawking Beetles, Hawking and Calling Irons;  
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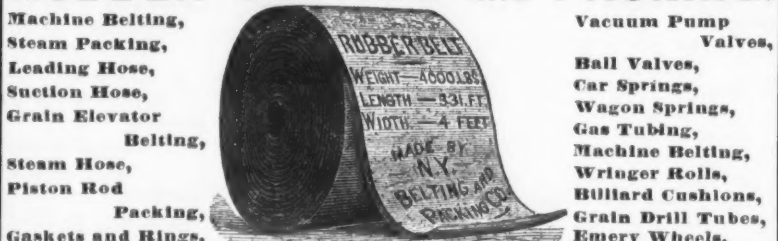
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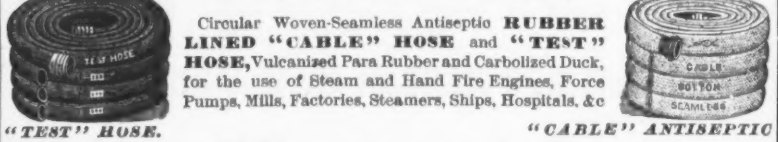
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**RUBBER BELTING and PACKING.**



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Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R.  
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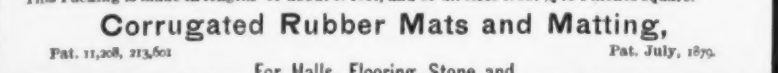
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ORIGINAL  
**Solid Vulcanite EMERY WHEELS**



The properties of these Wheels are such that they can be used with great advantage and economy  
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BEST IN THE WORLD.  
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**INGOTS FOR CASTING.**  
Send for Pamphlet and Price Lists.

## PHOSPHOR-BRONZE.

completed before the early part of 1883,  
with everything favorable. Allowing, how-  
ever, some time for delays, such as have  
occurred during the past two years, it will  
probably be the Spring of 1883 before the  
great bridge will be complete in all its  
details and ready for use.

## Recent Trade Mark Enactments.\*

(Concluded)  
**Ohio.**—The name "Domestic," applied to  
bread, may become a trade-mark whose in-  
fringement will be enjoined. *Smith vs.*  
*Curnan*, 5 Cinn. Law Bulletin, 145; Super-  
ior Court, Cinn.

**Pennsylvania.**—*Morse vs. Wornee* (10 Phil.  
Rep., 168, 1874). This was a motion for a  
preliminary or special injunction during  
pendency of the trial. The plaintiff used as  
a trade-mark the words "The Rising Sun."  
The defendant put up goods on which he  
affixed the words "Rising Moon." The  
court said "the defendant's label, in my  
judgment, lies very close upon the border.  
We will determine on which side of the line  
it is after the plaintiffs shall have estab-  
lished their right at law or upon final hear-  
ing." The case came on to be heard in  
1875, and a perpetual injunction was granted  
against the defendant. It was also decreed  
that all copies of the counterfeit trade-  
mark, and all plates for producing the same,  
should be given up to be destroyed, and  
damages and costs.

**Wisconsin.**—*Liedersdorf vs. Flint* (50 Wis.  
401, 1880). This was an action to restrain  
a defendant from using a trade-mark alleged  
to have been devised by him in imitation of  
that of plaintiff, and to be, in fact, decep-  
tive to purchasers, &c. *Fac similes* of the  
two trade-marks were annexed to the com-  
plaint. It was held that on demurrer it will  
not be decided; that the one is not sufficient-  
ly similar to the other to mislead and to con-  
stitute an infringement, unless the dis-  
similarity is so marked as to leave no doubt  
in the mind of the court; but the question  
of infringement will be reserved until the  
coming in of the proofs.

**United States.**—*Federal Courts.*—What  
may Become a Trade-Mark.—The word  
"Yankee," applied to a soap. *Williams vs.*  
*Adams*, 7 Reporter, 613.

The word "Parabola," applied to needles.  
*Roberts vs. Sheldon*, 15 O. G., 1277, N. D.  
of Ill., 1879.

**What Cannot Become a Trade-Mark.**—A  
system of lines marked or stamped upon  
plugs of tobacco.

*Dansman & Tobacco Co. vs. Raffeur*, 15  
O. G., 559; N. D. of Ill., 1878.

Letters and figures affixed to merchandise  
by a manufacturer, for the purpose of denot-  
ing its quality only, cannot be appropriated  
by him to his exclusive use as a trade mark.  
*Manufacturing Co. vs. Trainer*, 101 U. S.  
Sup. Ct. Ref. 51, 1879. (See *Amoskeag*  
*Mfg. Co. vs. Spear*, 2 Sandf., 599, 1849.)

**When an Injunction will be Granted.**—  
The plaintiff's firm had long been accustomed  
to pack a compound called "Hamburg Tea"  
in long cylindrical packages with pink  
wrappers, and to have a circular paper of  
directions, and yellow ones of warning, tied  
in with each package, and their firm name  
printed across a white label within a circle  
pasted across the ends of the string, and the  
same embossed with the words "Hamburg  
Hopfenack, 6," on another white label  
pasted on the package, so that the package,  
by its form and colors, would be at once  
known by its general appearance, without  
taking time to read anything on it; and  
their wares had come to be well known as  
theirs by the appearance of the packages.  
B. openly used such style of package and  
firm name to put up Hamburg tea. He then  
discontinued the use of the firm name, and  
of the words "Hopfenack 6," but continued  
to use the exact form and style of package,  
substituting his own name merely for that  
of the firm on the labels. Held, that, with  
the proper parties before the court, B. ought  
to be restrained by injunction from such use  
of the symbols (see same case, motion for in-  
junction, 13 Blatch., 234, 1876). *Freese vs.*  
*Bachof*, 14 Blatch., 432; S. D. of New York,  
1878.

A person has no right to mark his goods  
with any words or terms indicating that  
they are manufactured under a patent which  
he does not own and has no right. *Wash-  
burn & Moen Mfg. Co. vs. Haish*, 18 O. G.,  
465; N. D. of Illinois, 1879.

The general rule is to enjoin when the  
imitation is so close that by the form,  
marks, contents, words, or their special ar-  
rangement, or by the general appearance of  
the infringing device, purchasers exercising  
ordinary caution are likely to be misled  
into buying the article bearing it for the  
genuine one. It is not necessary, to entitle  
a party to an injunction, that a particular  
trade-mark has been infringed. To satisfy  
the court that the respondent intended to  
represent to the public that his goods were  
those of the complainant, is sufficient. *Mc-  
Lean vs. Fleming*, 95 U. S. Supreme Court,  
245. *Sawyer vs. Horn*, 1 Federal Rep.,  
Md., 1880.

**When an Injunction will be Refused.**—E. &  
T. Fairbanks & Co., manufacturers of scales,  
alleged that J. made scales, by using, to  
make the iron castings thereof, the corres-  
ponding parts of a scale made by them, to  
form the moulds for those castings, and that  
the general shape and arrangement, and  
color and external appearance of such scales  
were imitated from the Fairbanks scale so  
nearly that only an expert in scales could  
distinguish the difference between them.  
The words "Fairbanks patent" were cast  
on the scales made by both parties. All the  
patents which Fairbanks & Co. have had  
expired. Fairbanks & Co. applied for  
an injunction to restrain J. from using the  
words "Fairbanks patent" on his scales,  
and from making or selling an imitation of  
Fairbanks & Co.'s scales. Held that the  
application must be denied; that the words  
"Fairbanks patent" were not a trade-  
mark; and that J. did not represent his  
scales to be of the make of Fairbanks & Co.  
*Fairbanks vs. Jacobs*, 14 Blatch., 337; S.  
D. of N. Y., 1877.

\* Prepared by Francis Forbes, Counselor at  
Law for the United States Trade Mark Asso-  
ciation. For statutes prior to 1879 see *The Iron*  
*Age* of Dec. 11, 1879; Dec. 18, 1879; Dec. 23, 1879;  
April 20, 1880; May 6, 1880; May 13, 1880; May 20,  
1880; June 10, 1880.

Proof that the trade-mark is deceptively  
used by the complainant, and the public is  
deceived by his sales, defeats his claim to  
an injunction. *Manhattan Medicine Co. vs.*  
*Wood*, 14 O. G., Me., 1878. *Seabury vs.*  
*Grosvenor*, 14 Blatch., 262; S. D. of New  
York.

G. having a patent for an improvement  
in stoves, acquiesced during the entire dura-  
tion of the patent in the manufacture and  
sale by M. of stoves containing said im-  
provement, with the name "Charter Oak"  
upon them. After the patent expired M.  
continued to make and sell stoves contain-  
ing said improvement, and to put the name  
"Charter Oak" upon them, but did not  
represent them as made by G. G. claimed  
the name "Charter Oak" as a trade-mark  
applied to stoves containing said improve-  
ment, and brought a suit to restrain the use  
of it by M. on such stoves. Held that M.  
ought to be so restrained. *Filly vs. Child*,  
16 Blatch., 376; S. D. of New York, 1879.

An injunction will not be granted to re-  
strain a manufacturer from using a label  
bearing no resemblance to the complain-  
ant's, except that certain letters, which  
alone convey no meaning, are inserted in  
the center of each, the dissimilarity of the  
labels being such that no one will be misled  
as to the true origin or ownership of the  
merchandise. *Manufacturing Co. vs. Trainer*,  
101 U. S., 51, 1879.

**Title.**—There cannot be an ownership of  
the same trade-mark at different places by  
different persons. Licensees under a prop-  
rietor of a trade-mark may lose their rights  
by disregarding the territorial limits pre-  
scribed by the license for their sales; or by  
relinquishing the use of the mark in their  
business and adopting another of their own  
designing. *Manhattan Medicine Co. vs.*  
*Wood*, 14 O. G., 519; Me., 1878.

A right to a trade-mark may be lost by  
non-user for eight years. *Blackwell vs.*  
*Dibrill*, 3 Hughes, 151; Va., 1878.

If owners of trade-marks have been rea-  
sonably diligent in prosecuting infringers,  
abandonment is not to be inferred from the  
infringements. *Williams vs. Adams*, 7 Re-  
porter, 613; Ill., 1879.

A trade-mark may be owned by one mem-  
ber of a firm by whom goods, on which it is  
used, are manufactured. A trade-mark  
may be sold with the establishment when  
the goods known by it are manufactured.  
*Kidd vs. Johnson*, 100 U. S. Supreme Court,  
617, 1879.

The right of the proprietor of a trade-mark  
to the exclusive use of the same, and to pro-  
tect and enforce his exclusive right by pro-  
ceedings in chancery, exists by virtue of the  
common law, and independently of the  
statute. The decision of the Supreme Court,  
therefore, declaring the trade-mark statu-  
te of 1870 unconstitutional, does not affect  
suits in the federal courts under the common  
law. *U. S. vs. Roche*, 1 McCrary, 385; Col.,  
1879.

**Transmission of Power by Electricity**  
**In Mining.**—The first instance on record of  
the application of electricity for the trans-  
mission of power is reported from France.  
The *Société de l'Industrie Minière*. The St.  
Claude shaft at Blanz was sunk to the depth  
of 500 meters (1640 feet), for the purpose of  
searching for a faulted portion of the coal  
seams, and a heading was run from it across  
the strata. When this heading had reached  
a length of 400 meters (1312 feet), the ven-  
tilation became so poor that the temperature  
at the face rose to 95° F., and the miners  
could work only for a few hours. After  
some ineffectual attempts to improve the  
ventilation by simple means, it was decided  
to put in a fan 2.63 feet in diameter, and  
run it by power transmitted by electricity.  
An 8 to 10 horse-power portable engine was  
put up above ground, and, with a Gramme  
dynamo-electric machine, was run at a speed  
of 1200 revolutions per minute. The elec-  
tric current thus generated was conducted  
by a cable, consisting of seven 0.044-inch  
copper wires, to a second Gramme machine  
coupled directly with the fan, and placed in  
the heading near the shaft. Running at 700  
to 800, it required 2½ horse-power, the use-  
ful effect being at least 60 per cent. The  
temperature at the face was only lowered  
5 degrees, but the men could work in eight-  
hour shifts. The return current was con-  
ducted from the underground machine by an  
iron wire cable. The cost of the whole plant  
is stated to have been only one-third of what  
a machine for delivering compressed air to  
the heading would have required.

Wilmington, Del., is one of the oldest  
and most successful manufacturing towns in  
the Middle States. During the census year  
ended June 1st, 1880, there were 239 manu-  
facturing establishments in the city of Wil-  
mington, with an invested capital of \$3,218,-  
895; number of hands employed 5950—the  
average being 5297—of whom 4659 were  
males over 16 years of age; amount paid in  
wages, \$1,757,013. The amount paid for  
raw material was \$5,338,692, and the value  
of product \$3,216,838. Shipbuilding, iron,  
and a few other industries are not included  
in the above figures.

A London correspondent, under date of  
Aug. 15, sends the following approximate  
figures of ships and engines building in  
Great Britain, from Lloyd's surveyors' re-  
turns to June 30, 1881: Total number of  
iron ships building in the United Kingdom,  
June, 1881, 550 of 900,000 tons; total num-  
ber of steel ships building in the United  
Kingdom, June, 1881, 50, of 120,000 tons.  
Gross tonnage, 1,020,000 tons. Total number  
of marine engines, 526, of an effective  
horse-power of 500,000.

An immense derrick is in use upon the  
new City Hall in Albany. The mast is 70  
feet high and the boom is 75 feet in length.  
By its use stone weighing less than 10 tons  
can be lifted from the street and swung to  
any corner of the building.

The plate glass works now in existence  
in the United States are six in number, and  
are located at the following places: Bork-  
shire County, Mass.; New Albany, Ind.;  
Jeffersonville, Ind.; Louisville, Ky.; Crystal  
City, Mo., and Pittsburgh, Pa.



# The Iron Age

AND  
Metallurgical Review.

New York, Thursday, September 22, 1881.

DAVID WILLIAMS - - - Publisher and Proprietor.  
JAMES C. BAYLES - - - Editor.  
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and advertisements on our regular terms.

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The recent accidents to the shafts of sev-  
eral steamers, notably to the screw shaft of  
the Catalonia, and the discovery of a flaw in  
the crank shaft of the Servia, have drawn  
the attention of shipbuilders to these as the  
weak points of great vessels, and led to  
the question if, with our present modes of  
manufacture, we have not reached the limit  
of increased size in these vessels. John  
Roach, the veteran shipbuilder of this coun-  
try, is reported to have said on this question  
of shafts: "I do not want to criticize the  
work of other men, but since 1871 we

have built 64 steamers, and not one of  
them has had a broken shaft. Iron has  
its time of usefulness, just as men and  
horses have. That time once upon the iron  
must be born again. Our railroad men  
understand this law. They know how  
much weight one of their freight cars is  
built to carry, and they know how far  
those cars are made to travel. When the  
shafts beneath these cars have run out  
their natural lives the railroad men throw  
them out, although there may be no visible  
defect in them. Iron has a way of crystal-  
lizing in process of time, and often when  
a much-used piece of it breaks you can  
find no flaw in the material—no apparent  
reason for its giving way. To obviate the  
danger we make our shafts a little larger,  
and, as I tell you, none of them have  
broken." While Mr. Roach has made some  
large shafts, we are not sure that he has  
made any as large as those of the Catalonia  
and Servia. However this may be, if  
vessels are to increase in size, and speed be  
sought, it will do no harm to consider the  
advantages of using other methods of mak-  
ing shafts than forging.

## The Nation's Bereavement.

The tolling bells which broke the stillness  
of Monday night, proclaimed so much with  
iron tongue and brazen lips, that there re-  
mains but little for the journalist to say.  
The President is dead! Our best hopes are  
disappointed, our worst fears realized.  
Through eleven weeks of anxiety the nation  
has watched by the bedside of the suffering  
Chief Magistrate, alternating between cheer  
and gloom—now with smiles when the phy-  
sicians spoke hopefully, again with tears  
when some new danger menaced the life  
which had become so dear to the people.  
All that is left us now is a cherished memory,  
and it must thrill the heart of every  
citizen with worthy pride to know that his-  
tory will find in the story of his life a noble  
example of that which is worthiest and best  
in the typical fruits of American civilization.  
President Garfield was in the fullest sense a  
representative American. Born in poverty,  
the son of a farmer; fighting his way  
steadily upward and onward in the face of  
difficulties which would have discouraged a  
weaker nature; rising step by step to posi-  
tions of dignity, trust and honor; advanc-  
ing from local to national prominence on  
the claims of personal merit and trust-  
worthiness; chosen to the Presidency by an  
unquestioned majority,—his life, up to its  
crowning event, was not unlike that of  
many another great and good man of whom  
our people are justly proud. Perhaps in  
no other life was greater than most of  
those with whom he can properly be com-  
pared. His ripe culture, indomitable energy,  
broad statesmanship, modest demeanor and  
acknowledged personal purity, are qualities  
to which few men attain. The respect of  
the nation ripened into love when his heroic  
fortitude and unflinching courage were made  
manifest by the terrible tragedy of July 2,  
and he will live in the hearts of his country-  
men with the great and gentle Lincoln, with  
whose life and death his offers a strange  
parallel.

But he is dead! The trusted hand no  
longer guides the ship of state; the watch-  
ful eye and calm judgment of the ripe states-  
man no longer mark or direct her course.  
What of the future? Already his high office  
is filled by his constitutional successor.  
There is and will be no shock or panic.  
Every man goes calmly about his affairs  
with confidence that this change of adminis-  
tration is the least of the dangers through  
which the republic has passed safely. Much  
as we loved and trusted the President who is  
dead, much as we deplore his death as a  
national calamity, none the less are we loyal  
to our country and earnest in our wish and  
will to support his successor. The weary weeks  
of the President's fatal illness have not been  
without benefit. We have had time to think.  
Our fears have subsided, our passions cooled,  
our hopes revived. They have, let us believe,  
been fruitful of benefit to the man who has  
stood a silent spectator, waiting the sum-  
mons to take the solemn oath of the Presi-  
dential office. He has learned the hearts of  
the people, as well as the will of the people.  
He has seen how easy it is for the President  
who does right to win and hold, not only the  
confidence and respect, but the love of the  
American people. On the one hand he has  
seen arrogance humiliated, pride discomfited,  
insolent pretension rebuked; on the other  
hand he has seen the whole people, forget-  
ting party distinctions, kneeling in prayer  
for the dying President, with earnest supplica-  
tion for his recovery. He, too, has had time  
to think. What he has thought no man  
knows, but who can doubt that his think-  
ing has been of benefit to himself and  
the nation. He cannot have failed to see  
that should it devolve upon him to assume  
the duties of the high office for which another  
was chosen, his future would be wholly in his  
own hands. Assuming the Presidency un-  
trammelled by obligations, at a time when  
party strife is subdued by national grief,  
and when the whole American people stand  
ready to support and sustain him, he has a  
magnificent opportunity. We have faith  
in him. We believe that he has felt the  
responsibility of his position before the  
people too long and too keenly to be misled  
by bad advice, or entrapped into mistakes  
by those in whose political sagacity he once  
trusted. The people will respect and trust  
him until he shall betray their confidence.

Of a man untried in positions of official  
trust and responsibility we might have  
doubts; of President Arthur we have only  
confident hopes, and in the name of the busi-  
ness community we tender him the assur-  
ance that he will enter upon his administra-  
tion with the sympathy and support of all  
good citizens.

## The Coming Telegraph War.

There can no longer be any doubt that the  
opposition threatened at the outset against  
the combination of the Western Union and  
American Union telegraph companies, is  
likely to become formidable. It is claimed  
that the lines already united for this purpose  
comprise 50,000 miles of wire, and that  
within a few days they will cover a territory  
extending from Baltimore and Washington  
to St. Louis and St. Paul, as well as many  
important points in the Dominion of Canada,  
while the Eastern Telegraph Company, of  
Maine, and the Rapid Telegraph Company,  
of New York, will form nuclei for further  
extensions. Thus it appears that even so-  
called great monopolies are not omnipotent,  
and that it is possible not only to form, but  
to maintain, competing organizations, de-  
spite the engulfing and centralizing power  
of accumulated capital. The Western Union  
managers, however, do not betray any  
great alarm. It is charged by their rivals  
that their position is weak; that even when  
Mr. Vanderbilt was in control it was with  
difficulty that he paid 7 per cent. on \$40,-  
000,000 capital, and that now to pay 6 per  
cent. on \$80,000,000 is utterly impossible.  
Further, it is charged that the Gold and  
Stock Telegraph, formerly a source of large  
revenue, and also the Cuban Cable and  
other valuable properties, have been sold,  
and the cash proceeds put into the revenue  
account to keep up appearances. The  
president of the Western Union, in rebuttal,  
is reported as saying that, notwithstanding  
sales of this character, the company holds  
more of those stocks than at the time of the  
last annual statement, besides buying out  
the Montreal Telegraph Company and lines  
built along the California and Oregon Rail-  
road, which will soon be opened for  
business, not to speak of other pur-  
chases equally important, so that the  
Western Union now controls between  
320,000 and 340,000 miles of wire.  
This company is certainly a tremendous  
power to contend with, even if we admit,  
as affirmed by Mr. Rufus Hatch, that the  
whole system could be duplicated for  
\$20,000,000. Perhaps, too, as charged by  
Mr. Hatch, the lines are far from perfect.  
"It is well known to all electricians," says  
this gentleman, "that wire after a certain  
time deteriorates, loses its conductivity,  
and becomes so susceptible to the slightest  
disturbance in the atmosphere that mes-  
sages are delayed and lost. The wire, in  
fact, becomes old iron." After making  
all deductions, the Montreal Union Company,  
which will open for business next month, has  
in hand a large undertaking. Mr. Geo.  
Wm. Ballou, the president, says their lines  
will connect five-sixths of the large com-  
mercial business centers, and will open to Chi-  
cago with no less than sixteen wires—possi-  
bly twenty—and add to those as fast as  
needed. He says:

We enter the telegraph field for the purpose  
of giving the public a vastly superior, quicker  
and better service in every way, at the same rates to  
begin with, which, however, may be reduced from  
time to time as fast as the public, by their confi-  
dence and patronage, may enable us to do so. Our  
lines will be rapidly extended all through the  
winter to every point that can be made profitable,  
and the company intend to furnish private wires  
between principal points for firms and individuals  
who may be willing to rent them on reasonable  
terms. The work of construction, even after our  
opening next month, will be pushed forward in all  
directions, and as fast as the business warrants it  
new wires will be strung up, to give the public  
abundant facilities for all the business we may be  
honored with.

Mr. James Keene is known to be associ-  
ated in the new enterprise, and Mr. Wm.  
H. Vanderbilt is supposed to be among  
the backers. Competition of this kind, if it  
can be sustained, will ultimately give us  
cheaper and more satisfactory telegraph  
facilities; and if these must be secured by  
wiping out some millions of watered stock,  
representing a fictitious valuation of the  
property of the Western Union Company, no  
advantage will result from delaying this pro-  
cess two years or ten. The question of  
interest to the business community is not  
whether telegraph service is now as cheap  
as the Western Union Company can afford,  
but whether it is as cheap as it could be and  
pay interest on a capital representing the  
actual value of a telegraph plant. The  
watering of stock ultimately leads to this  
kind of competition, and companies heavily  
handicapped with stock issues representing  
fictitious capital, are always vulnerable to  
the attacks of competitors not thus burdened  
with the necessity of earning interest on  
stock dividends.

The St. Louis *Age of Steel*, in its issue of  
September 3, in an article full of misstate-  
ments and misrepresentations, returns to its  
old falsehood that the Pittsburgh mill own-  
ers encouraged the Cincinnati strike, and  
now adds to it the further falsehood that  
part of the contributions sent to aid the strik-  
ers was furnished by the Pittsburgh mill  
owners. The editor tries to shield himself be-  
hind an "it is said," but this does not help  
matters much. Now, we have the very best  
evidence that the Cincinnati manufacturers,  
who are the parties most interested, neither  
say this nor believe it, and the evidence is

that of a committee of these manufacturers,  
who stated this fact positively to us. Now,  
will the *Age of Steel* state who makes the  
assertions it claims are made. Failing in  
this, it will confess that its claim to veracity  
is not worth vindicating.

## The Position of Lead.

Until within a month or two lead was com-  
paratively dull. The long and severe winter  
spoiled the spring trade in this article, and  
led to a good deal of disappointment, caus-  
ing the metal to drop to 4¼ cents in May  
and June, but the building activity, so long  
restrained, soon developed with greater  
vigor throughout the country, and an unin-  
terrupted and increasing demand for lead  
soon grew up, which has gradually, without  
much aid from speculation, carried the price  
beyond what it was early in the year. The  
following table will show the course of the  
market in 1880, and so far the present year:

PRICE OF COMMON DOMESTIC LEAD AT NEW YORK.— PER 100 POUNDS.				
	1880.		1881.	
	Lowest.	Highest.	Lowest.	Highest.
January.....	\$5.75	\$6.00	\$4.95	\$5.00
February.....	5.95	6.00	4.90	5.00
March.....	5.50	5.95	4.65	4.85
April.....	5.40	5.75	4.45	4.85
May.....	4.50	5.25	4.25	4.62½
June.....	4.50	4.75	4.25	4.37½
July.....	4.50	4.75	4.37½	4.90
August.....	4.50	5.00	4.75	4.90
September.....	4.80	4.90	4.95	5.25
October.....	4.65	5.00	.....	.....
November.....	4.75	4.85	.....	.....
December.....	4.30	4.75	.....	.....

In England the price also fell below what  
it was last year, but is now recovering. The  
average there during the past seven years  
has been in each year as follows:

AVERAGE PRICE OF GOOD SOFT ENGLISH PIG LEAD  
IN THE LONDON MARKET.—PER TON.

	£ s. d.		£ s. d.
1880.....	16 5 10	1876.....	21 15 9
1879.....	14 18 7	1875.....	22 3 0
1878.....	12 17 4	1874.....	21 6 8
1877.....	20 13 0	1880-1874.....	19 3 3

IMPORTS INTO AND EXPORTS FROM GREAT BRITAIN.

	Imports.	Exports.	Excess.
	Tons.	Tons.	Tons.
1876.....	80,713	35,921	44,792
1877.....	94,414	45,495	54,947
1878.....	100,213	34,385	65,828
1879.....	108,140	36,770	71,370
1880.....	95,202	33,247	61,955
1881, 7 months.....	57,430	24,868	32,562

The excess of import into England, which  
reached its maximum in 1878 and 1879, it  
will be seen has since decreased somewhat,  
and at the rate for the first seven months,  
would this year be reduced to 55,820 tons.  
This may have contributed to the recent  
recovery in value in London. The fact is,  
that since the termination of the Carlist  
rebellion, Spain has turned out lead at the  
rate of 90,000 to 100,000 tons annually, and  
the bulk of this has been thrown on the  
London market, while there has been no  
extra war demand. Then came the bad  
crops and the release into dull times last  
year; but this summer business has been  
picking up by degrees on the Continent,  
building is more active than usual, and the  
consumptive demand develops in a rather  
unexpected manner. This is fortunate for  
lead producers, inasmuch as their output last  
year reached the unprecedented aggregate  
of 430,000 tons, taking all producing coun-  
tries together. Spain, the United States, Eng-  
land and Germany turned out in 1880 no less  
than 365,000 tons jointly, and adding thereto  
Mexico, Greece, Russia, Belgium, Austria and  
some other countries, with a joint production  
of 65,000 tons, we get at the total we have  
given. Yet, in spite of this increase of  
100,000 tons in the world's output during the  
past five or six years, the price in London  
was, without the interference of specu-  
lation, higher last year than it was in 1879,  
as we have shown.

In the United States, production increases  
faster than it does in Western Europe,  
which is mainly owing to developments at  
Leadville and other points where argentif-  
erous lead is mined. There were shipped  
from Leadville during the first six months  
of the current year, 18,193 tons of base  
bullion, against 15,172 tons during the corre-  
sponding period in 1880. The apprehension  
that we were producing more lead than we  
were able to consume, and that we should,  
therefore, be compelled to seek a market  
either in China or Europe at a very low  
figure sooner or later, in order to rid our-  
selves of the surplus, caused speculators for  
a rise to leave lead alone; but develop-  
ments so far this year seem to prove  
sufficiently that current consumption has  
kept pace with the swelling output,  
and that we shall be able to absorb  
what is turned out this year, even if  
it should reach 120,000 tons—at least this is  
the belief entertained by many. If, how-  
ever, the price be run up much further by  
speculation and Europe not advance in the  
same ratio, there would, of course, be some  
shipments this way, and a couple of thousand  
tons thus coming would do more harm to  
holders than a silent increase in Western  
output of five times this amount. Anything  
like an artificial excitement here is, there-  
fore, to be discouraged under the circum-  
stances. Lead at about 5 cents seems to be  
cheap enough to stimulate consumption, but  
as soon as it approaches 6 cents, particularly  
if near the winter months, consumption  
would be materially curtailed.

The letter which we print on another  
page from Mr. C. C. Cole, of Des Moines,  
who represents the Iowa Farmer's Protective  
Association, makes a very clear statement  
of the grievance of the Western farmers in  
regard to the barb fence wire patents. As  
the Washburn & Moen Manufacturing Co.  
had the use of our columns last week for a  
statement of the case from their standpoint,

we cordially extend the same privilege to  
Mr. Cole. His letter will be read with  
interest.

## Accidents to Employees.

The first case of any importance under the  
English Employers' Liability Act has just  
been decided. This law, which went into  
operation last January, increased the liability  
of employers for injury to their employees,  
and made them liable, in certain cases, for  
injuries to the employees that arose from the  
negligence of their fellow workmen. The  
case at issue was one for £312 damages, for  
an accident arising from the alleged negli-  
gence of a fellow workman. The men  
were engaged in decorating a house. In  
order to reach the ceiling it was necessary  
to have a scaffolding of some kind, and one  
was made of boxes. The man who was  
afterward injured objected to going on it,  
as it was unsafe, but one of the men who  
was a quasi-foreman promised to hold it.  
The work went on for an hour or two, when  
the structure fell and the plaintiff's leg was  
broken. The defense urged that no order  
to use the scaffold had been given to which  
the plaintiff was bound to conform. The  
burden of the defense was that the act was  
only intended to apply to injuries caused by  
defects in machinery that the employer was  
bound to keep in order and that the  
employee had no means of investigating, and  
did not apply to machinery or appliances  
that the workman made for himself. The  
jury found on all points for the defendant.

This result is similar to that reached in  
several cases in this country that have  
already been reported in our columns—  
notably one at Pittsburgh, in which damages  
were sought for an accident resulting from  
the breaking of a scaffold at the Keystone Bridge  
Works. The gist of these decisions is that  
the employer is not responsible for the acts  
of a quasi-foreman, or of a man who may be  
left in charge of a "job." Nor are they  
liable for damages for an accident that  
results from the weakness or breaking of a  
structure, if that structure was built by the  
workman, or if he could inform himself as  
to its strength and safety.

## French Capital in Canada.

Canadians are exulting greatly in the  
accessions of French capital lately received,  
considerable amounts having been invested  
in various forms of enterprise. Steam-  
ship and railway projects, manufacturing  
and mining, are all being materially aided  
in their development, and prospects, as  
regards both population and resources,  
are such that a prominent Ottawa paper  
admits they "are brighter now than  
at any previous period of their history."  
The explanation of this friendly mani-  
festation on the part of capitalists in  
France, is said to be the encouragement  
offered under the national policy. A Mr.  
Senecal, who has just arrived at Quebec  
from Paris, is quite enthusiastic over the  
large amount of capital which he finds ready  
to be placed at the disposal of all kinds  
of reliable and bona fide companies in Canada,  
such as the South Shore Tunnel at Montreal,  
an electric light company, working deposits  
of iron, erecting factories for the manufac-  
ture in the Ottawa Valley of sulphuric acid,  
superphosphates, &c. French delegates are  
expected within a few weeks, to inquire and  
report. Among the projects receiving atten-  
tion are the two steamship lines, one  
between Rouen and Montreal in summer  
and Halifax in winter; the other from  
France to Brazil, via Canada and La Plata;  
a syndicate to contract the Pacific Railway,  
and lease or purchase outright the North  
Shore Railway. In addition, as stated by a  
St. John's editor:

A company has been formed in Paris, with a  
capital of 12,000,000 francs, for the development  
of the mineral deposits in the Laurentian range.  
Another company in France, with a capital  
of \$1,500,000, have already entered upon phosphate  
mining along the Du Lièvre River, where they  
have paid \$100,000 for the land. Still another  
French company, with \$100,000 capital, has taken  
up lands in Ottawa County to develop its rich iron  
mines. There are two Credit Foncier Companies  
formed in Paris, with \$10,000,000 of capital each,  
who have already lent, within a few months, over  
\$500,000 each to farmers at 6 per cent, and their  
operations extend to Ontario, Manitoba and New  
Brunswick.

Finally, there are two French companies  
organized, one to manufacture phosphates,  
and the other best sugar, known as the  
Union Sucrière. The Canadians congratula-  
te themselves upon having recently ob-  
tained a Government loan of \$4,000,000 in  
Paris, at exceedingly favorable rates, and  
we hope nothing will occur to disappoint  
their bright anticipations.

A statement has recently been made in a  
New York paper, and telegraphed to other  
parts of the country, to the effect that As-  
sistant Secretary of the Treasury French, at  
the request of the Standard Oil Co., about a  
year ago rendered a decision that admitted  
plate iron as manufactures of iron not other-  
wise provided for, but that recently this  
decision has been reversed, and that suits  
are now to be instituted against the Stand-  
ard Oil Company to recover the duties the  
Government failed to receive. The case  
here referred to is evidently the tank iron  
case, which was described Feb. 24th, 1881,  
in which the Secretary held that "tank  
plates" were plate iron in the meaning of  
the tariff act. That Judge French ever  
decided that these were manufactures of  
iron dutiable at 35 per cent. ad valorem, is



not only untrue, but absurd. In May last this question came up incidentally in connection with the car truck channel case, and the decision of Feb. 24th, 1881, was again affirmed—incidentally, however, not directly. Since then the case has not been before the department in any form, and it is difficult to see what has called forth this statement of it. Certainly there is no intention on the part of the Government to sue the Standard Oil Company, as stated, for even if it were true that the rate of duty had been changed as alleged, it is not the custom of the Treasury Department to enter suit for any deficiency of duties arising from such causes.

#### The Coal Situation at Pittsburgh.

A curious complication has arisen in Pittsburgh over the demand of the miners for an increase in the price of digging of  $\frac{1}{2}$  cent a bushel, or from  $3\frac{1}{2}$  to 4 cents. As we state elsewhere, the miners were successful and the operators conceded the advance. But now comes the miners' secretary and asserts that the operators have advanced the retail price of coal out of all proportion to the price paid for digging. The assertion of the secretary is that the retail coal dealers advanced the price of coal 57 1-7th per cent., while the miners have only received an advance of 33 1/2 per cent. in their wages, and he cites the following figures, taken from a household consumer's receipts for coal, to prove it:

Date of Receipt.	Price of mining.	Retail price.
October 24, 1880.....	3 c.	70 c.
November 20, 1880.....	3 1/2 c.	80 c.
January 26, 1881.....	3 1/2 c.	90 c.
March 15, 1881.....	3 1/2 c.	100 c.
September 16, 1881.....	4 c.	110 c.

Advance in mining, 1 cent; advance in retail price, 4 cents, or 33 1/2 of an advance in wages and 57 1-7th per cent. in retail price of coal.

It should be stated that the coal dealers deny this, and assert that the advance in price has been but 2 cents. However this may be, the miners' secretary proposes either that the price of coal at retail shall be reduced before September 24 or the miners will demand 5 cents a bushel for digging. Should this demand be refused, and a strike occur, it will certainly be one of the "notable cases of strikes." It will be really a strike to reduce the selling price of product by increasing the cost of production. While there is great indignation over the action of the retail dealers, and a good deal of sympathy with the movement of the miners, the proposition of the miners, logically stated, is a most amazing one. It proceeds on the assumption that the price of mining is the only element that regulates the selling price, when the fact is that the selling price is abnormally high because of the short supply arising from the drought, and were there to be rain sufficient to cause a rise in the rivers, coal would drop at once. Until this comes, this attempt of the miners to reduce selling price by increasing cost will be watched with a good deal of interest.

The revival of Irish industry was among the subjects brought up for the action of the recent National League Convention. To encourage the revival of Irish manufactures, or any legitimate form of industry, is commendable, for self-reliance and enterprise are sadly needed among the Irish people. But the task is a hopeless one. An attempt to induce the Irish nation to Boycott England, by purchasing only Irish manufactures and products, must fail, for England will not allow Ireland to attain any importance as a producing country, except for farm produce, and capital cannot be induced to seek investment in Irish manufactures under circumstances so unfavorable to profit. Ireland has no future so long as her destinies are directed by England, and political independence is something so nearly impossible that it is idle to speculate as to its probable effects.

The Fair Trade movement seems to have received cold comfort from the Trades Union Congress which met in London last week. The telegraph dispatches reporting its action are necessarily brief, but it appears that not only did the congress expel certain delegates that appeared as representatives of so-called labor organizations that were really Fair Trade bodies, but it pronounced against Fair Trade, or return to protection. The struggle that is now going on in England is only of interest to this country as a study—something more than a curious one, as it involves the argument of certain principles that we believe are vital, and concerning which this country has been regarded as holding absurd ideas. This gives it an interest and meaning for us.

The coal miners of Western Pennsylvania, at a convention held in Pittsburgh last week, demanded an advance in the price of mining of  $\frac{1}{2}$  cent a bushel, or from  $3\frac{1}{2}$  to 4 cents, and the demand was conceded. This applies only to the railroad mines or those that ship coal by rail. The success of the demand is due to two causes: First, the drought in that region, which has prevented all shipments by river and made a greater demand on the railroad mines. This has led to the second cause, which is the demand of those points that get their coal by lake that shipments be hurried forward before navigation closes for the winter. It looks as though this demand and increase would be general, at least in Western Pennsylvania and Ohio. The Hocking Valley miners and those of other points have made demands, but as we write the reports as to the result are con-

flicting, but if the Ohio continues long at its present state of dryness, Hocking Valley coal will be at a premium. These advances must have some effect on the iron and nail market in the West;  $\frac{1}{2}$  cent advance for digging means 1 cent or more advance in selling price, and as coal is a large item in the manufacture of iron, this advance will have its effect on the price of iron. The East has already advanced nails to \$3.40, and it is more than likely that the West will advance soon.

#### The Iowa Farmers and the Barb Fence Wire Patents.

DES MOINES, IOWA, Sept. 10, 1881.

To the Editor of The Iron Age—DEAR SIR: Absence from home and pressing duties here have delayed my answer to your asking me to favor you "with a statement of those (Iowa farmers) you (I) represent, and of the action they propose to take." Your letter and request are alike courteous and respectful, and are entitled to a candid and frank answer.

The farmers of Iowa and of the Northwest have been victims to claimants of alleged patents of drive wells, gates, churns and other things. Those who claim to be patentees, by themselves or agents, have visited the farmers and demanded the payment of some small sum, \$10 or \$20, for alleged infringement of the particular patent drive well, gate, or whatever it might be, that the farmers had used, and in case of refusal have threatened litigation in the Federal Courts, where alone such matters may be litigated; and to give color to their threats, have sometimes brought numbers of suits. The farmers in very many instances have paid the price demanded, rather than subject themselves to the expense of employing a lawyer to resist even a groundless claim. In this and other ways the farmers have been greatly imposed upon. Those whom I represent have recently organized themselves into a corporation, pursuant to the laws of Iowa, under the name of the "Farmer's Protective Association," for the purpose of the manufacture, purchase and sale of barbed wire and other articles used by farmers, to protect its members from unjust and illegal extortion by alleged patentees and monopolies, and generally to aid its members in securing articles used by farmers at as near the original prime cost to the manufacturer as is practicable.

It is quite probable that the immediate stimulus to this organization was the decision by the Chicago court sustaining the barbed wire patents in favor of the Washburn & Moen Mfg. Co.

Those suits were brought claiming under seven distinct patents, all of which, save two, were reissues, and the court held the two original patents worthless, or, to use the language of the court in respect to one of them: "There was nothing new in Glidden's last patent, and no room for the claim of invention in the wire therein provided."

The reissued patents in every case, it is claimed, were materially different from the originals, and embraced devices in actual use by the farmers before such reissue.

To illustrate, we take the first and original Glidden patent, which is the only one finally sustained by the decree of the court in the above case. We quote from the original patent claim in the original patent to Glidden, as follows:

"I do not claim to have originated the devices known as spurs or prongs on the wires, they having been used before, but confine myself to the means for holding the spurs at proper intervals on the wires, and to the means for attaining a uniform tension of the wires, as claimed. I claim the combination of the wires B C, slotted tube G, coil spring I and post K, for keeping the wires in proper tension in various temperatures, as described and shown."

In Mr. Glidden's reissue, under which Washburn & Moen obtain their decree, his claim is as follows: "What I claim as new and desire to secure by letters patent is: In combination with a fence wire, a barbed wire of a short piece of pointed wire secured in place upon the fence by coils between its ends, forming two projecting points, substantially as specified."

Now, the farmers of Iowa claim that this reissue, being materially different from the original patent, and being a patent for that which Mr. Glidden, in his original specification expressly states "has been used before," is not a valid patent under the patent laws, and that such invalidity is so manifest upon the face of the two patents that he who runs may both read and see. The patent law provides that, "Whenever any patent is inoperative or invalid by reason of the patentee claiming as his own invention or discovery more than he had a right to claim as new, the commissioner shall, on the surrender of such patent and the payment of the duty required by law, cause a new patent for the same invention and in accordance with the corrected specification to be issued to the patentee \*\*\* but no new matter shall be introduced into the specification."

The Farmer's Protective Association claims that Mr. Glidden introduced new matter in his specification, and that the patent issued to him was not for the same invention. The same change of specification and introduction of new matter exists in every other reissued patent under which the Washburn & Moen Mfg. Co. claim.

The facility with which patentees can secure reissues of their patents, with such enlargements of the specifications as to embrace improvements brought into public use subsequent (as well as prior) to their original patent, is well known to many; and when patentees, or their assignees, are wealthy, reissues are very common, and they very often, yea almost uniformly, are made to include inventions not in the mind of the inventor at the time he prepared his original specifications.

The farmers of Iowa are not opposed to patent laws, nor to the largest liberality in manufacturing, West as well as East, but they are opposed to the perversion of the patent law and the violations of its spirit, so uniformly perpetrated under the re-issue clause. They want that re-issue clause either repealed or so modified and guarded as to prevent frauds under it. They

make no war upon decisions of courts or upon the laws of the land, other than such as is legitimate and requisite to procure wise, correct and just decisions and proper legislative action. This much respecting the legal or judicial phase of the grievances of the farmers in the Northwest.

But the farmers have a greater grievance in the practical workings of the decision referred to, and the conduct of the Washburn & Moen Mfg. Co. and their licensees upon the bona fides of the controversy wherein the decision was rendered, that became a licensee, and, in connection with the Washburn & Moen Mfg. Co., are perpetrating the grievance I am about to state.

The Washburn & Moen Mfg. Co. do not grant to their licensees freedom in quantity of manufacture or in price of the product, but they so limit the manufacture of each as to them seems wise, and fix the price to consumers at 10 cents per pound for painted, and 11 cents per pound for galvanized wire. The monopoly of a lawful patent the farmers make no complaint against. They would not object to paying even the royalty fixed by the Chicago court for Mr. Haish, one of the defendants, to wit:  $\frac{1}{4}$  of a cent per pound. Barbed wire of just as good quality as can now be obtained at 10 cents per pound, has been sold in Iowa for years prior to the decision at from 6 to 7 cents per pound, and it can be manufactured in Iowa to-day, with a fair profit to the manufacturer, a fair profit to each wholesaler and retail dealer, and the  $\frac{1}{4}$  cent royalty to the Washburn & Moen Mfg. Co., and sold to consumers for 7 cents per pound. And by the action of the Farmer's Protective Association, its members are to-day, and have been ever since its organization, furnished with the wire at 6 1/2 cents per pound; and if thereto be added the  $\frac{1}{4}$  cent per pound royalty, it would only make 7 1/4 cents. And when the Farmer's Protective Association shall have completed its arrangements as it contemplates, it will furnish to its members the wire at 6 1/2 cents, or at 7 cents per pound after paying the  $\frac{1}{4}$  cent royalty to the patentees.

Now, the grievance of the farmers is, not that they may be required to pay a reasonable royalty to the patentees of, say,  $\frac{1}{4}$  of a cent per pound, but that they are compelled to pay a bonus to the monopoly of the Washburn & Moen Mfg. Co. and its licensees of 3 cents per pound over and above such legitimate and fair royalty to the patentees. Will The Iron Age look at this practical view of the question, and say whether the farmers of the Northwest have not a grievance?

Mr. Washburn stated to a committee of the farmers of Iowa, in Des Moines a few weeks since, that there were sold in Iowa during the last year over 150,000 tons of barbed wire. Now, the farmers of Iowa do not complain, and would not complain at paying to the Washburn & Moen Mfg. Co., as assignees of the patentees, a  $\frac{1}{4}$  cent per pound royalty, or the sum of \$2,250,000 per annum. But when Mr. Washburn and his licensees add thereto 5 cents per pound, thereby taxing the farmers of Iowa \$2,250,000 more than such legitimate royalty, the farmers of Iowa affirm that they have a grievance, and against which extortion and outrage it is not only their right, but their bounden duty to organize.

Mark you, the farmers have been paying in the years past the royalty when they have purchased the wire at the price of from 6 to 7 cents, for they purchased either directly from the Washburn & Moen Mfg. Co., or from other companies who were liable to pay (and hence, in fixing their price, took the same into account) the  $\frac{1}{4}$  cent per pound royalty to them. The farmers of Iowa in years past have, therefore, not complained at paying into the pockets of the patentees the \$2,250,000 per annum; but when, by their combination, they create a monopoly and demand the additional sum of \$9,000,000 a year from the farmers of Iowa, then it is that the farmers say they must have protection against such monopoly, extortion and outrage.

I am aware that the farmers are misrepresented, through pamphlets with which the monopoly is flooding the country, and are charged with being opposed to patent laws and opposed to the payment of legitimate and proper royalty to patentees. I deny the assertions for the farmers of Iowa, each and all of them. They are liars upon the most important, the most patent, the most law-abiding and the best people of this or any other State. The Iron Age and its readers know as well as your correspondent the cost of plain wire, and that it can be purchased for less than 4 1/2 cents per pound. They may know that it can be manufactured into barbed fence wire for approximately  $\frac{1}{4}$  cent per pound. Let them take the price of the wire and the cost of manufacture and see the margin between it and 7 cents per pound, and your readers will be convinced that the farmers of Iowa are not without grievances, against which it is their duty both to protest and, in every legitimate and proper way, resist. If Washburn & Moen had been content with a legitimate royalty, and had not organized an oppressive monopoly in addition thereto, the farmers would have paid it rather than resort to litigation, although confident that the result of the litigation will demonstrate the utter invalidity of their claimed patents and the fraud connected with their reissues. Very respectfully, C. C. COLE.

**Treating Auriferous Ores.**—A new process for extracting gold from complex auriferous ores was recently tried at the Crown Engine Works, Lambeth. The process is known as Molloy and Warren's, and is chiefly intended for dealing with refractory ores, such as are to be found in the Indian and other gold fields. The machinery consists of a patent crushing stamp, resembling a steam hammer, a reverberatory furnace for roasting the crushed ore, and chemical apparatus for extracting the gold by means of acids. About half a ton of crushed and washed ore was placed in a tank, on a roughly constructed platform, and connected by piping to chambers containing nitro-hydrochloric solvents. The ore was subjected to the solvent action of these for a

short time, and the solution of gold and silver thereby produced was chemically treated to throw off the metals. These were then melted in an ordinary crucible, and a fair quantity of the precious metals was the result. Part of the process includes the re-conversion of the acids, so that they can be used again and again. The only waste is that due to leakage through defective joints, or the imperfect washing of the acids. The inventors claim that a ton of ore may be treated at a cost of 25/, and that 90 per cent. of the metals in the ore can be extracted by the process.

#### METALLURGICAL NOTES.

##### THE STEEL AND COAL INDUSTRIES OF RUSSIA.

From a report on the trade of Taganrog (Russia) during the past year we get some information relative to these industries. It is stated that the general tone of the steel and coal industry of the interior has, in spite of the prevailing distress all over the land, been satisfactory and encouraging. Exports to the Black Sea ports, as well as to some of the Azoff ports, have shown a marked increase on those of former years; and the ordinary work of the lighterage to the roads stands having been much reduced, and the coasting craft having had very little to do during the past year, placed them more at the disposal of the coal trade. Many excellent seams have been found and worked, and the general feeling in the country is that these mineral riches ought to be fully developed. The imperial government appears also to be solicitous in regard to this matter, and is making efforts to have the industry adequately developed. The opinion is expressed that cheap carriage from the mines to the shipping port, and greater facilities for loading, are all that are required to enable this industry to become one of the important staples of trade in this part of the empire. We note that the local iron and steel works have, notwithstanding their increased working power, more orders on hand than can be immediately executed. Large quantities of steel rails of superior quality were manufactured and shipped at Taganrog for Poti, for the new railway in course of construction from that town to Bakow. The demand for pig iron has been in excess of the quantity produced at the works; consequently, the imports of this iron increased during 1880. It is expected, however, that the addition of 10 per cent. to the import duties, payable in gold, which makes the duty on this article equal to 10/10 sterling per ton, will oblige consumers to send their orders to the local works. The great obstacle in the way of the development of this branch of Russian trade—and, indeed, of that of most other native industries—is the exorbitant charges for railway transport, which give the foreign article an advantage over the native one, and allow of a sharp competition being carried on. At the same time we note the statement that the improvement of the iron trade in England, whence the imports are mostly drawn, is in favor of the Russian works, and that if the productive power of the latter be suitably increased to provide for the demand, foreign imports will stand a poor chance. It is further stated that nothing has transpired from the visit last summer to Taganrog of certain engineers and representatives of a large New York firm, with the object of establishing iron works and otherwise developing the resources of this rich mineral district.

##### LUCE FILS ET ROZAN'S PROCESS OF DESILVERIZING LEAD.

This process, as employed by Messrs. Cookson & Co., was described in a paper by Mr. Cookson at the last meeting of the British Association. The lead containing silver is melted in a pot raised sufficiently high above the ground level to allow of the contents being run into a second and larger pot raised about a foot above the floor. This latter pot is at least double the capacity of the upper one, and in the apparatus most recently erected is capable of containing 50 tons of lead. The upper pot is open at the top, but the lower one is provided with a cover having hinged doors, and from the center of the cover a funnel is carried to a set of condensers. The lower vessel is also provided with a steam inlet pipe by means of which steam can be blown up through the molten metal. The operation performed in this apparatus depends upon the same principle as the Pattinson process, namely, that when silver lead cools, the crystals first formed contain less silver than the portion of the metal which remains longest liquid. In using the apparatus the lead is melted in the upper vessel, and the dross being removed it is run down into the lower vessel among the crystals remaining from a previous operation. When the whole charge is melted it is again drossed, and steam is then blown through it to prevent it from setting at the top or outside, while to quicken the formation of crystals small jets of water are made to play on the surface of the lead. The ebullition caused by the passage of the steam is very violent, and, under the influence of this action and the cooling effect of the water, the formation of crystals, singularly enough, goes on with great regularity. When about two-thirds of the contents of the pot have become thus crystallized, the metal remaining liquid is run off into large cone-shaped ingots. From the time that a 30-ton charge is melted and fit to work, to the time that it is crystallized and ready for tapping, is about 35 to 40 minutes, while the tapping occupies about 8 minutes. Before the lead begins to crystallize, the upper pot is charged with lead of half the richness of that in the lower pot, and when the latter has been tapped, it is recharged by running down metal from the upper pot, this metal being of the same richness as the crystals left in the lower pot. This operation is repeated, the new metal being halved in richness each time, until the percentage of silver remaining in the crystals is so low that they are finally melted and run into pigs for the market.

The fusibility of soft solders is increased by adding bismuth to the composition. An alloy of lead four parts, tin four parts, and bismuth one part, is easily melted, but this alloy may itself be soldered with an alloy of

lead two parts, of bismuth two parts and tin one part. By adding mercury, a still more fusible solder can be made. Equal parts of lead, bismuth and mercury, with two parts of tin, will make a composition that melts at 122° F., or an alloy of tin five parts, lead three parts and bismuth three parts, will melt in boiling water. In mixing these solders melt the least fusible metal first in an iron ladle, then add the others in accordance with their infusibility. To cast strips of solder, pour the molten metal on a flat surface of stone or metal, drawing the ladle along the while to leave a thread of metal of the desired substance.

#### LABOR AND WAGES.

For two years and a half there has been no general strike among the coal miners of Western Pennsylvania.

The pit drivers in the employ of the Birmingham Coal Company, Pittsburgh, who struck for \$2.25 per day, received the advance, which was 25 cents.

Youngstown, O., September 18.—The brakemen and firemen in the New York, Pennsylvania and Ohio yards here, some 50 in number, struck this morning, leaving the tracks badly blockaded. The brakemen want a raise from \$1.75 to \$2 per day and the firemen from \$62 to \$70 per month.

The members of the Amalgamated Association in the West have been given their wages every two weeks instead of every month as heretofore, and now the non-union men, to the number of 900, threaten to strike unless they get paid every two weeks.

A suit has been entered in Pittsburgh against Joseph McConnell, a well-known coal operator, for the refusal to allow one Robert Hogg to act as check weighman. The case involves the right of the miners under the act of Assembly to employ any person they choose as check weighman.

The proposed general strike of miners in the Hocking Valley will be abandoned, as the operators have decided to advance prices of mining to 80 cents per ton, an advance of 10 cents a ton.

The Cornish miners employed at the Cleveland mine, Ishpeming, struck on Thursday morning to enforce a demand for the inauguration of a Cornish custom—a half holiday on Saturday and no work on Saturday night, with full pay. The strike extended to the other mines and meetings of the strikers were held, but the strike was resisted by the mine managers and lasted but a day or two.

Eight rolling-mill hands from Reading and four from Pottstown, who were induced to go to Portsmouth, Ohio, found that a strike existed at that place. They were taken in charge by the union men engaged in the strike, hospitably entertained and had their expenses home paid.

The E. & G. Brooke Iron Company posted a notice in the rolling mill on the 17th, informing the puddlers that their wages would be increased to \$4 per ton, and that the wages paid the nailers would be advanced to 10 per cent. upon the present prices, and a like percentage added to the wages of the other mill hands. The increase was advanced by the rise in the price of nails and will take effect on the 1st of October. The notice is supplemented by a proviso, stating that in case the present price of nails is not maintained, the men will have to suffer a reduction in proportion to the rate in which products of the mill recede in value.

The coal miners of the railroad mines near Pittsburgh have received an advance of  $\frac{1}{2}$  cent a bushel for digging. The price is now 4 cents, but they threaten to strike for another cent unless the retail price of coal is reduced from 11 to 9 cents.

The scarcity of men continues at some of the industrial works here. At one of the mills machinists and other mechanics have been assigned to different labor from that which they are accustomed to in order to keep all portions of the works going. There is no reason for any healthy, honest workman in Pottstown being idle.—Exchange.

A dispatch from Warren, Ohio, dated the 14th, says: The entire force of men employed at Westlake's rolling mill went out on a strike this morning, because of the discharge of 11 puddlers. The officers of the Amalgamated Association came down here and have legalized the strike.

The strike of the glass house boys, at Pittsburgh, is practically ended. The bottle boys in all the factories returned to work yesterday at the wages offered by the manufacturers, and the finishing boys are about to follow their example.

**Isthmus Coaling Stations.**—An American correspondent on the Isthmus of Panama is exceedingly disgusted by the apparent apathy of the United States Government in regard to securing coaling stations on that coast. He deprecates the fact that American influence thereabout is gradually failing, especially since the masterly maneuver of the Lesseps Land Company in gaining possession of the Panama Railroad, although obtained at a cost of \$2,500,000 per annum, paid in subventions to the Colombian Government. This correspondent directs attention to the fact that all English war vessels at Panama take a run to the Pearl Islands, lying 37 miles distant in deep water, with the ostensible object of studying astronomy, but how the use of surveying instruments can further this object does not appear. As the coveted coaling stations are within the disputed territory between Costa Rica and Colombia, the present moment, it is suggested, may be opportune for taking possession, if the United States means to acquire rights in that quarter. But in regard to these matters the Secretary of State is, doubtless, well advised.

Mr. Charles Latimer, Chief Engineer of the New York, Pennsylvania and Ohio road, has placed on the frogs and guard rails in the Cleveland yard a new invention, called a "foot-guard." The invention consists of a flat steel spring placed in the opening, or "boot-jack" ends, of frogs and guard rails, or in any place where one's foot would be likely to be caught. This spring fills the place sufficiently to keep the foot out of it, while it will yield to the pressure of the wheel flanges, and thus avoid any risk of running the wheels off the track.



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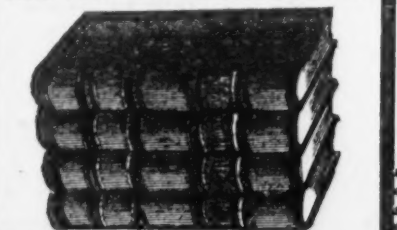
**NOTICE TO THE TRADE.**  
There are six patents, domestic and foreign, on

**Rubber Window Cleaners.**  
We own them all, and shall suppress infringements. The genuine cleaner is plainly stamped, "Manufactured by Perfection Window Cleaner Co., incorporated July 26, 1878." Has patent hollow handle with P. W. C. Co. cast in face. Our manufacturing facilities are so large that we undersell cheap and worthless imitations. We gladly mail sample cleaner with price lists to wholesale trade. Address:

**Perfection Window Cleaner Co.,**  
St., 167 Madison Chicago, Ill.

**THOMAS S. SMITH,**  
PERFORATED SHEET IRON,  
Steel, Brass and Zinc  
For all their various uses.  
Screens for Ores and Coals, Wheat, Corn and Smut.  
Also, Malt Kilns, Coffee Roasters, &c. All sizes of Nuts, Washers and Chain Links and General Blacksmithing. 127 & 139 E. Pearl St., CINCINNATI, O.  
Send for Price List.

SEND FOR ILLUSTRATED PRICE LIST.



## ACCOUNT BOOKS

**UNITED MFG. STATIONERS,**  
P. O. Box 2044, New York.

## CLOTHES WRINGERS.



**T. J. ALEXANDER, Manager,**  
BOSTON, MASS.

The Patent Combined  
**Dinner Pail and Lantern.**

The most perfect Dinner Pail in the world. Fits coffee for dinner and a Lantern at night.  
Manufactured by J. H. HAUGHT,  
Post Office, N. Y.  
Sent by express on receipt of \$1.00. Agents wanted.

**VERMONT SNATH CO.,**  
Manufacturers of  
**Pat Swing Socket Snaths**  
and also a large variety of other styles of Snaths  
Springfield, Vermont.  
Represented in New York by Lamson & Goodnow Mfg. Co.

in resinously electrified bodies is greater than that of vitreously electrified bodies, the state of excess, or, in other words, is a true plus electrification, and this is the electrification of our earth relatively to surrounding space.

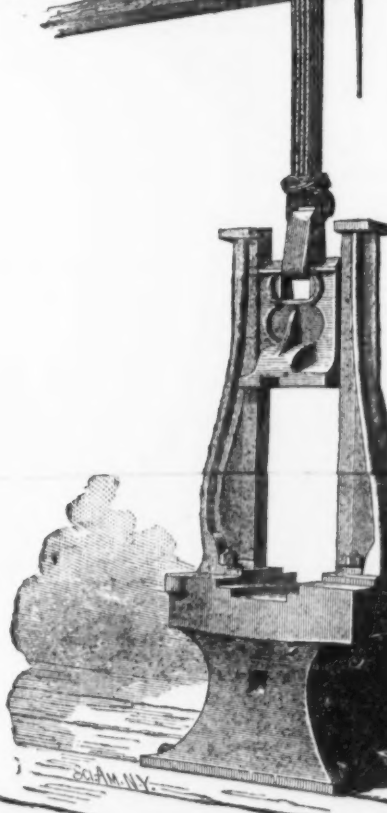
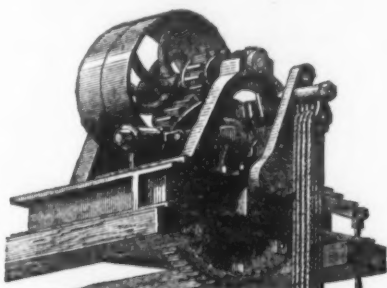
Dr. W. G. A. Bonhill, of Philadelphia, has presented to one of the London hospitals

AN AMPUTATING MACHINE, which is said to be very ingenious. The apparatus consists of an iron standard carrying a train of multiplying gear, which by means of an endless cord passing over pulleys, transmits a rapid rotary motion to either small drills or circular saws, as the case may require. These drills and saws are attached to the end of a series of rods connected by universal joints, forming elbows, which permit the operator to move the cutting instrument in any direction he pleases while it is revolving at high speed. These instruments are only intended to deal with bone, and when it is desired to hold the fractured parts of a bone rigidly together in a certain position, holes are drilled into it, and pins inserted, which being held in a steel frame keep the parts in the position desired. The circular saws are employed to cut away portions of the bone, or sever the entire shaft. For simple amputations a small straight saw can be fitted into a holder,

with two wires, and the earth, which usually takes the place of one wire, is dispensed with. But this requires excellent wires. The magnetic storm of August 28, 1860, is the severest of which any record exists. For several days no batteries were needed. So strongly were all electric currents disturbed that the electrolytic plates, from which the Springfield Republican was printed, could not be made. The Sandwich Island volcano showed great activity at the time, and many new sun spots appeared, to which phenomena many persons attributed the storm. Magnetic disturbances which interfere with the telegraph are not always accompanied by a light from the aurora borealis which can be distinguished.

## Improvement in Drop Presses.

The accompanying illustration represents an improvement in the lifting apparatus of drop presses, recently perfected and introduced by Messrs. Williams, White & Co., of Moline, Ill. As may be seen by inspection of the engraving, several features are essentially different from those in use in apparatus well known to the public. In the first place the connection between the crank pin and hammer is slightly elastic, and, therefore, acts as a cushion. The proper tension, which was a matter of some diffi-



IMPROVEMENT IN DROP PRESSES.

and as the latter is attached to a small eccentric work from the main gearing, it has a very rapid reciprocating action imparted to it by means of a small hand-wheel. By this means the comparatively slow oscillation of the surgeon's hand is superseded by the extremely rapid motion of the mechanical saw; and thus the time of an operation is greatly shortened, while the operation itself is much more neatly performed, owing to the small size of the saw and its high velocity.

During the past few weeks the operations of the telegraph companies have been seriously interfered with by

MAGNETIC STORMS, which have been of frequent occurrence. One occurred in this vicinity on the night of the 12th inst., greatly interfering with the transmission of press and other dispatches. The magnetic storm travels very much like an ordinary storm, but more rapidly and in waves. It is in this respect like a hot or cold wave of air, but can only be felt by the telegraph operators. If the storm is moving in the same direction as the current on a telegraph wire, the battery current will become so strong as to be unmanageable. If the storm travels in the opposite direction, the battery current will be entirely neutralized and no work can be done. When the current derived from the magnetic storm becomes so strong as to render the instruments useless, the wires are disconnected from the batteries and worked with the magnetic storm alone. This has been frequently done on even long circuits with perfect success. Mr. Hamilton, the electrician of the Western Union Telegraph Co., has known the wires between New York and Buffalo to work for six hours at a stretch without the aid of batteries, and similar instances are sometimes reported from other cities. When telegraphy was new no use could be made of the wires when such a storm affected them, heavy sparks flying from the instruments and frightening the operatives. The fact that the line would work without the battery in such circumstances was discovered by accident. When working without the battery the work can be done only in waves, all currents ceasing at intervals of a few moments and reappearing. If finely insulated wires are at the disposal of the operator, what is called a loop circuit is made

easy to arrange in the old style of presses is easily obtained by the arrangement here shown. This connection can be applied to old presses, and, therefore, is a feature of interest in itself. The manufacturers state that quite a demand has arisen for connections of this kind to replace old straps on lifters of drop presses of other manufacturers. Internal steel ratchets whose teeth are much stronger than of external ratchets are used in constructing this lifter, and the ratchet being attached to the rim of the main driving gear, the transmission of the strain through the arms of the gear wheel is avoided. The greatest strain on crank and ratchet drop presses comes when the dog fails to catch a tooth at its farthest rebound, which causes it to fall back to the next tooth. The ratchet in this apparatus contains 45 teeth, and hence the falling back is reduced to a minimum of distance.

The new material of which it is proposed to construct pipes in which to lay telegraph wires underground, is described as very light—only about one-sixth the weight of iron—and, being composed almost entirely of pure carbon, is indestructible, whether in the air or underground; it does not rust or change by exposure, and is not affected by heat or frost. The most important characteristic claimed for it, however, in connection with underground wires, is its being a perfect insulator. Pipes of this material need not, it is stated, be buried very deep in the ground, as they may be of a semi-elastic character, adjusting themselves to the slight upheaval and depression of the ground through the action of frost.

The two molders in a Chicago foundry who refused to strike with their fellow workmen, and, a few days later, were almost blown into eternity by a charge of gunpowder which they discovered in a mold just as they were ready to pour into it the molten iron, have arrived in Troy and secured work there. They were frightened from Chicago by threats of murder, and admit having left that city secretly in fear of their lives. The unfortunate result of their flight is the probability that, in their absence, the molds who came so near blowing up the foundry will be acquitted through lack of evidence.



## Activity in Clyde Shipbuilding.

The Edinburgh Scotsman says: The Clyde shipbuilding trade is still fully engaged, and although the output of vessels is heavy, orders continue to be received sufficient to keep the yards well occupied. The new contracts, however, are for a much smaller class of vessels than many of those lately launched. The aggregate tonnage put into the water this month has been 32,730 tons, nearly double that of August last year and 7630 over that of August, 1874. In the eight months the tonnage launched was 214,990 tons, an increase of 67,990 over the same period last year, and of 35,590 tons over the output in the eight months of 1874, hitherto the busiest year for shipbuilding. The present month's aggregate has been largely augmented by the launch of two of the largest class of steamers, viz., the Carthage of 5100 tons, for the Peninsular and Oriental Company, and the India, 4100 tons, for the British India Company. The average size of the vessels launched this month was 1560 tons, as against 940 tons in August, 1880, and 1320 tons in August, 1874, and for the eight months 1500 tons, as against 870 tons for the eight months in 1880, and 1390 tons for the same period in 1874. The vessels on the stocks number 124, the figures being the same as at the close of last month. Within the Glasgow district there are 54, while there are 32 within the Renfrew and Dumfries and Greenock district. Of the vessels in course of construction, there are 18 about ready for launching, 32 planned, 55 in frames and 19 keels laid or in course of being laid. In Messrs. Elder & Stevens' yards there are 8 vessels being constructed in each, Messrs. Thomson, in the middle district, and Messrs. Scott, in the lower district, have each 7. Messrs. Barclay, Connal, and Henderson have 6 each. There are two yards with 5 each, seven with 4 each, seven with 3 each, six with 2 each, and five with 1 vessel each. At this time last year the vessels on the stocks numbered 92, while at the close of August, 1879, when the shipbuilding trade was at its lowest ebb, there were only 54 vessels on the stocks. The vessels launched during the month and eight months of this year, as contrasted with corresponding periods, were:

	Month—		Eight months—	
	Vessels.	Tons.	Vessels.	Tons.
1881.....	21	32,730	153	214,990
1880.....	21	16,000	109	147,000
1879.....	13	10,700	137	114,800
1878.....	21	21,100	181	155,700
1877.....	15	11,200	159	107,500
1876.....	19	25,100	122	109,500

Nails.—Nail making may be called a truly American industry, for, although nails were made in the mother country even before America was discovered, the world owes to this country the invention and the perfection of the nail-cutting machinery now in use. In the good old times all nails were made by hand. The iron was drawn into rods at the mills and the nails were made by the blacksmiths on the anvil. The work was not hard and was done by men, women and children. The first step toward a machine was the invention of an arrangement of tilt hammers, which, by rapid striking, made several nails in one heating of the rod. The next machine had a set of rollers with molds of nails on their face, and the strip of iron was forced between these. In all, about 300 patents for nail machines have been granted, and 23 of these were issued before the beginning of the present century. The abundance of timber in America and the moderate expense at which a house could be set up, urged the mechanics in their efforts to make a practicable nail machine. At present the iron comes to the nail maker in strips just the width of the length of the nail to be made. This strip is fed by hand into the cutting machine and the cutter clips off a nail, which is then grasped by a powerful vise, which holds it while the "header" presses up the large end into a head. The nail then drops into a box with its companions, and the workman turns the strip over, and another nail is cut. One of the machines will cut from one-half to a ton of nails a day. All sorts of patent machines have been made, and in some machines the angle of the cutter is changed with each cut to avoid turning the strip, but the nail makers in New England—and, in fact, all east of the Alleghenies—still adhere to the old style of feeding by hand.

Mr. A. D. White, late United States Minister to Berlin, says: "I believe the electric railway is destined to be one of the great things of the future. They have two miles of railroad in Berlin worked upon this principle, and the result is a complete success. Not alone on surface roads is it particularly advantageous, but on elevated roads as well. It would work a revolution on the 'L' roads in New York, with speed just as great as at present, no coal cinders or smoke of engines, and at much less expense."

The great factory of the Singer Mfg. Co., at Elizabeth, N. J., said to be the largest in the world, is for sale. Among the reasons suggested by officers of rival sewing machine companies are the following: That the atmosphere rusts the metal parts of the machines; that the taxes are too heavy, and that the company hold bonds of the city of Elizabeth and find it impossible to collect the principal.

The greasy coating on metallic pistol cartridges is not, as many suppose, an animal product, although in appearance it resembles tallow; it is a vegetable growth, and is known as Japanese wax. The Japanese wax tree is very remarkable, not unlike a sumac, and it is from one of the same species that the varnish so largely used in Japanese lacquerware is manufactured.

A sleeper is one who sleeps; a sleeper is also a car where a sleeper can sleep; and a sleeper is, too, a thing over which runs the sleeper in which the sleeper sleeps, so that the sleeper in the sleeper sleeps, while the sleeper runs over sleepers, as well as sometimes leaps off the track.

The German Iron Trade.—Advices from Germany are more satisfactory, and several contracts for iron, iron wire and rolling material are looked forward to. The Phoenix, of Laar, has secured an order for 281f. 25c. per ton for delivery at Ruhrort, against 311f. 50c. demanded by the Bochum Works for delivery at Montigny. At the recently held general meeting of the Bochum Iron Works, Herr Baare read a lengthy report on the condition of the German iron industry, in which he referred to the discussion which has taken place with respect to the variation between prices for foreign and inland supply. He said that while the home demand is declining, the production is increasing, and therefore, German manufacturers have to seek fresh outlets abroad for the sale of their goods, and in order to resist the competition of English manufacturers, prices have to be accepted which leave only a small profit to the makers. A reduction in the production would not have the same effect, because, to attain cheapness, it is essential that the production should be large. For each ton of rails that is exported at a loss to the German manufacturer, at least six times that quantity of raw material is imported, giving remunerative employment to the working classes and dividends to the railways.

We learn that the New York Pneumatic Tramway Company, of which Mr. Boyd is president, have nearly ready for trial an engine designed to operate on the elevated railways. It will be remembered that this company ran engines for a considerable period on Second Avenue, but finally withdrew, hoping for better results in another direction. The new engine is said to work well, but it will not be brought out before some time in October.

Since the American line of steamers to Brazil was withdrawn, sailing vessels or a triangular route by steam via Liverpool have been the only means of communication. Mr. John Roach confirms the report that a new direct steamship line will shortly be established. It is seriously contemplated, he says, to take advantage of the French laws to build the ships jointly with French and American capital, and it is possible that Brazil may demand to have them under her own flag.

## Special Notices.

## New and Second-Hand MACHINERY.

One Horizontal Engine, 15½ in. x 30 in. Todd & Raper.  
One Horizontal Engine, 3 in. x 6 in.  
One Beam Corliss Engine, H. P.  
Two Horizontal Return Tub Boilers, 100 h. p. each.  
One Horizontal Return Tub Boiler, 6 ft. x 14 ft. 6 in. tubes.  
Two Horizontal Return Tub Boilers, 4½ ft. x 14 ft. 6 in. tubes.  
One Locomotive Steel Boiler, 30 h. p.

MAINTENANCE TOOLS.  
Five Lathes, 22 in. x 12 ft. New.  
One Lathe, 17 in. x 8 ft. New.  
One Lathe, 16 in. x 6 ft. New.  
One Lathe, 16 in. x 6 ft. Blaisdell.  
One Planing Machine, No. 4. Wood & Light.  
One Milling Machine, 36 in. x 3 ft.  
One Upright Drill, 36 inch.  
One Burleigh Rock Drill, 4 in. New.  
One Hotchkiss Compressed Air Hammer, 40 lbs.  
One Styles & Parker Foot Press.  
One Siles & Williams Foot Press.  
One Peck, Stow & Wilcox Foot Press.  
One Cameron Steam Pump, No. 2.  
One 6 in. Tapping Machine, D. Saunders' Sons.  
One Daniels Planing Machine.  
One 100-ton Hydraulic Press and Pump.  
One Root Engine.  
One Pipe Cutting Machine.  
One Pair Paper Rolls.  
A large stock of Shafting, Pulleys, Hangers, Vices (Wrought and Cast), and other Miscellaneous Machinery.

J. GRAY'S MACHINERY DEPOT,  
37 Dey Street, New York, U. S. A.

## Machine Tools.

New and second hand. Among them a 200-hp. Bradley Hammer, Pulley Lathes, Boring Table, Foundry Ladles, Engines, Pumps, &c.; also, a great variety of Patterns and Drawings. Send for circular.  
WM. B. PARDEE,  
New Haven, Conn.

## Wanted.

A Blast Furnace Founder who has had experience in the use of Anthracite Coal in Blast Furnaces.  
Address, FOUNDER,  
P. O. Box 345, New York City.

## FOR SALE.

Eight H. P. Portable Hoister, J. S. Mundy; 80 lb. P. Horizontal Engine; new Vertical Boiler, 48 in. x 10 ft., 124 tubes; 6 x 8 Double Engine, Link motion; 18-in. x 12 ft. Lathe; 3-column Drills; Root Blowers; build; 6 Hangers, 2 x 16; 20-inch Drop; Copper-smith Shears, Heavy Platform Hoist.  
A. G. BROOKS & WINEBRENER,  
261 N. 3d St., Philadelphia.

## For Sale.

Four Rollers, each 26 ft. by 42 inches, two 16 in. diam. in each. Have been in use about seven years, and all patched. Also a lot of fittings for same, for sale. Address,  
BOX 1804,  
Altoona, Pa.

A MAN who has a thoroughly practical knowledge of the iron trade in all its branches, is a superintendent of roller and 6 years as assistant superintendent, desires a position; will be discharged in two weeks.  
Office of The Iron Age, 83 Reade St., New York.

HARDWARE.—A gentleman thoroughly posted in Hardware, Guns, Pistols and Cutlery desires a situation as salesman.  
Address, H. M.,  
Office of The Iron Age, 83 Reade St., New York.

WANTED.—An experienced Steel traveler; one who understands the trade.  
Address, stating terms, &c.,  
P. O. Box 3018, New York City.

## Special Notices.

## FOR SALE.—Machinery in Store.

One 8 in. swing Drill Lathe 4 ft. bed, hollow spindle.  
One 8 x 12 Portable Engine and Boiler.  
Two 8 x 12 Stationary Engines.  
Three 9 x 12 Stationary Engines, Link motion, suitable for hoisting purposes.  
One Cooper Steam Pump, 9 in. steam, 4 in. water, 14 in. stroke. The above are all second hand, re-fitted, and will be closed out cheap.  
Wood-working Machinery. Knowles' Steam Pumps, Fan and Cupola Blowers, Exhaust Fans, Emery Goods and Harrington's Screw Hoists, celebrated PHENIX STEAM ENGINES, 15 to 50 horsepower. Second to none, and 20 per cent. cheaper than any others.

I. H. PRATT, 15 S. Water St., Cleveland, O.

## For Sale.

The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown, deceased, consisting of Foundry and Machine Shop, and a large stock of Pattern Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. The works are now run, but in a very short time possession can be had, and terms of payment are offered to suit a purchaser of limited capital.  
Offered for sale by  
WM. McILVAIN & SONS,  
Reading, Pa.

NO COLLIERY OWNERS, IRON MASTERS, &c.—A man of the varied classes of men engaged in every department of coal and ironstone mining as a separate industry, or in connection with iron works, thoroughly conversant with coke making, calcining iron ores, &c., offers his services to any gentleman or company requiring confidential practical aid in conducting their works, or engineering new ground. Is conversant with the English government in mechanical engineering, and a gold medalist in mechanical engineering of ability, energy, integrity, &c.  
T. A. BARKES, 51 Willoughby ave., Brooklyn, N. Y.

## Superintendent Wanted.

A man thoroughly competent to manage an establishment consisting of Machine, Pattern and Blacksmith Shops, and Iron and Brass Foundry, employing 75 men, manufacturing steam machinery, and doing general job work.  
Address, JOHN M. MORGAN,  
Care of B. F. HARRIS,  
No. 3 Exchange street, Rochester, N. Y.

## Wanted.

By an engineer of extensive experience, thorough knowledge, exemplary habits and satisfactory personal and professional credentials, a position as superintendent or manager of an iron or steel rolling mill. A thorough, practical acquaintance with all departments of rolling mill work guaranteed. Address,  
MANAGER,  
Office of The Iron Age, 83 Reade St., New York.

## Wanted.

A good practical mechanic, capable of taking charge of the inside work of a Bolt and Nut Factory. He must furnish good reference.  
Address, LOCK BOX 1746,  
Youngstown, Ohio.

## Engine and Fly-wheel for Sale.

One second-hand double engine in good running order, with 14 in. link motion, made by the Lawrence Machine Co.; cylinders, 18 x 40.  
Also, a 20-ton fly-wheel, 20 feet in diameter, made from the very best of charcoal iron, a bargain.  
The above will be sold at a bargain if applied for soon. Address, WASHBURN IRON CO.,  
Worcester, Mass.

## MACHINERY ON HAND FOR SALE.

One Horizontal Slide Valve, Center-Crank, 20 Horse ENGINE (8 x 12); good as new Pulley and Fly-wheel; has double-link motion; can be run in either direction. Price, \$175.  
One Horizontal Slide Valve, Center-Crank, 15 Horse ENGINE (8 x 12), with Pump, Heater, Pulley and Fly-wheel, with 6-foot heavy Band Wheel, covered and independent Pump. Price, \$250. In good order; used about two years.  
One Horizontal, nearly new, Lord, Bower & Co.'s 15-wheel, in gear with Slide Valve, Side-Crank ENGINE, with Pulley and Fly-wheel, Bessemer Governor and Independent Pump. Price, \$200.  
One Portable ENGINE and BOILER, complete, repaired. Price, \$225. Ready for use.  
One 8-Horse BARRETT ENGINE and BOILER; used five years; newly repaired. Price, \$200.  
One 7-Horse (2 x 2) unit, only one week; sold because owner has gone into other business.  
One new Upright 8-Horse ENGINE (6 x 8), with Governor, Pump and Heater. Fly-wheel and Pulley. Price, \$150.  
One STEAM PUMP, 14-inch section, 6-inch stroke. Price, \$25.  
One Torment STEAM PUMP, new, No. B, 9½-inch section. Price, \$25.  
Six BOLLS FEED PUMPS, new, with tight and loose Pulleys, \$25 each.

## YORK &amp; SMITH, Cleveland, Ohio.

## Vertical Boring and Turning Mill

## Wanted,

new or second hand, to swing 6 to 8 feet. State where it can be seen.  
Address, STOKES & PARISH,  
30th and Chestnut sts., Philadelphia.

## Wanted.

To arrange with responsible parties having proper facilities and experience for the manufacture of most improved wood-working machinery, destined to meet extensive sales when thoroughly introduced. For further particulars, address  
Office of The Iron Age, 83 Reade St., New York.

## Wanted.

An experienced man to superintend lead smelting, calciners and stock furnace process. Apply with reference, stating salary expected.  
DESLOGE LEAD CO.,  
Bonnie Terme,  
St. Francois County, N. C.

A YOUNG MAN thoroughly posted in the job of a position. Has considerable acquaintance with the Southern and Western trade. Address, O. P.,  
Office of The Iron Age, 83 Reade St., New York.

## Sanderson Bros. Steel Co.

Forty shares for sale at a discount.  
EDWARD FRITH & SON,  
241 Pearl Street, New York.

## Special Notices.

## AUCTION NOTICE.

## BISSELL &amp; WELLES,

## Auctioneers.

## LARGE TRADE SALE

Hardware, Edge Tools, Files, Table Cutlery, Tinned and Enameled Ware, &c., &c.,

ON

TUESDAY and WEDNESDAY,

September 27 and 28,

At 83 Chambers and 65 Reade Sts., New York.

This sale will comprise a large line of Shelf Hardware, Edge Tools, Shovels and Spades, &c. Also, 300 tons Tinned and Enameled Ware, direct from factory. Also, by order of

THE NICHOLSON FILE CO.,

A complete assortment of their Royal Brand of Files, being the surplus that has accumulated during the past year. This brand is well known, and will comprise a full assortment of

Flat Bastard—3, 4, 5, 6, 8, 10, 12, 14, 16 in.

Flat Second Cut—3, 4, 5, 6, 8, 10, 12, 14, 16 in.

Flat Smooth—3, 4, 5, 6, 8, 10, 12, 14, 16 in.

Half Round Bastard—3½, 4½, 5½, 6½, 8½, 10½, 12½, 14½, 16½ in.

Half Round Second Cut—3½, 4½, 5½, 6½, 8½, 10½, 12½, 14½, 16½ in.

Half Round Smooth—3½, 4½, 5½, 6½, 8½, 10½, 12½, 14½, 16½ in.

Round Bastard—3, 4, 5, 6, 8, 10, 12, 14, 16 in.

Round Second Cut—3, 4, 5, 6, 8, 10, 12, 14, 16 in.

Round Smooth—3, 4, 5, 6, 8, 10, 12, 14, 16 in.

Hand Bastard—4, 5, 6, 8, 10, 12, 14, 16 in.

Hand Second Cut—4, 5, 6, 8, 10, 12, 14, 16 in.

Hand Smooth—4, 5, 6, 8, 10, 12, 14, 16 in.

Hook Tooth—10, 12 in.

Horse Rasp—10, 12 in.

Pitt Saw Files—4½, 5½, 6½, 8½, 10½, 12½, 14½, 16½ in.

Square Bastard—5, 6, 7, 8, 9, 10, 12, 14 in.

Mill Bastard—3, 4, 5, 6, 7, 8, 10 in.

Slit Tapers—4, 5, 6, 7, 8, 10 in.

Taper Saw Files—3½, 4½, 5½, 6½, 8½, 10½, 12½, 14½ in.

Double Cut Tapers—3, 4 in.

Hand Saw, Blunt—5 in.

We would call the attention of the trade to this sale of Files as being worthy their special notice. Buyers who cannot attend the sale can send their orders to the auctioneers, and goods will be purchased without charge. Also,

SPECIAL SALE OF

Table Cutlery, Carvers and Butcher Knives,

Comprising from 6 to 10,000 dozen. Also, a large line of Plated Knives, Forks and Spoons, 4, 8 and 12 oz. plate.

Notice.

The undersigned firm would be pleased to accept the representation of first-class firms manufacturing machinery. Address,

J. S. LIZARS & CO.,

Manufacturers of Shilds & Lizars' Feed Water-Heater and Puffer, and dealers in New and Second-hand Machinery, 33 Fifth Avenue, cor. Lake Street, Chicago, Ill.

## The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,

Issue Licenses to use the Process for the

Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens Martin, Puddling, Blast and Cupola Furnaces.

The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of The Iron Age of Oct. 25th, 1877.

## NOTICE!

SPECIAL SALE OF

## RAZORS.

SEE ADVERTISEMENT ON PAGE 10

OF

BRADFORD & ANTHONY, Boston.

## STEEL:

Its History, Manufacture, Properties, and Uses.

By J. S. JEANS,

Secretary of the Iron and Steel Institute.

Section I. History of Steel: Chap. 1. History of Steel; 2. History of Bessemer Process; 3. Progress of Iron in America; 4. History of Bessemer Process; 5. Steel in America; 6. Germany; 7. France; 8. Austria; 9. Russia; 10. Sweden; 11. Other Countries.—Section II. Manufacture of Steel: Chap. 14. Cementation and other Methods; 15. Manufacture by Bessemer Process; 16. Siemens-Martin Process; 17. Other Methods. Section III. Chemical and Physical Properties of Steel: Chap. 18. Phosphorus in Steel; 19. The Use of Manganese; 20. Spiegeleisen; 21. Sulphur in Steel; 22. Silicon in Steel; 23. Tensile Strength of Steel; 24. Mechanical Tests of Steel; 25. Analysis of Steel; Section IV. Use of Steel: Chap. 26. Application of Steel to Railway Purposes; 27. To Shipbuilding; 28. To Bridge Building; 29. To General Purposes; 30. Guns and Armor Plates; 31. Other Purposes. Price, \$1.00. FOR SALE BY

DAVID WILLIAMS,

83 Reade Street, New York.

## To Capitalists.

The advertiser has a complete, first-class rolling mill, with capacity of 30 tons per day, and controls special patents, which will give a profit of not less than \$10 per ton, with orders months in advance. \$50,000 is wanted (in installments) for a cash working capital for which a half interest will be given. The opportunity for profitable investment is seldom equalled.

Address, C. P. E.,  
Office of The Iron Age, 220 S. 4th St., Phila., Pa.

A YOUNG MAN wants a position as traveling salesman in a first-class Hardware House, with 15 years' experience in the General Hardware business.

Address, Box 93, Lewistown, Pa.

## Special Notices.

## JOB LOT.

## ELEY BROTHERS'

## GENUINE BLUE CARTRIDGE CASES,

Twelve Gauge.

The best paper shell in the market. For sale cheap. Supply limited.

ALFRED FIELD & CO.,

93 Chambers St., N. Y.

## HEAVY IRON WORKS WANTED.

An Eastern Manufacturing Company, doing a profitable business in heavy wrought iron structures, the United States and Canada, wish to establish additional work, located in the West, South, Pacific Coast and Province of Ontario. Must have first-class freight advantages for receiving rolled structural and merchant iron. Address

WM. O. DOUGLAS, Birmingham, N. Y.

## For Sale.

## The Little Schuylkill Rolling Mill,

at Milldale, Schuylkill County, Pa., near Port Clinton, on the line of the Philadelphia and Reading Railroad, consisting of a Merchant Bar Mill in complete running order, with a splendid water power sufficient to run the mill two-thirds of the year. Engines, Boilers, Foundry and Machine Shop, with Lathes for turning rolls, and all other appurtenances necessary to commence operation at once. Together with dwellings, stables and large tract of land, to be sold low if applied for soon. For further particulars address or apply to

J. O. RICHARDSON,

No. 232 Dock street, Philadelphia.

## For Sale.

## Two Corliss Condensing Beam Engines,

32 in. x 72 in. cylinders. Address, THE HARTFORD ENGINEERING CO., Hartford, Conn.

## For Sale.

Stock of Hardware, Fixtures, and Good Will of the subscribers, in the city of Norwich, Conn. Only one other hardware store. Population 25,000.

August 1, 1881.

FULLER & PARISH.

## For Sale.

## A Hardware and Tool Store

on reasonable terms. Probably the most desirable in Jersey City. Doing an excellent business. Inquire of

H. LUTGEN.

## For Sale.

## Hardware Stock and Trade in Michigan.

Those wishing to buy a complete stock and fine trade, and in a beautiful place to live, will find a rare chance by addressing

Office of The Iron Age, 83 Reade St., New York.

## For Sale.

## Hardware Stock and Business.

Located in one of the best towns of Northeastern Pennsylvania. Stock clean and well assorted, suited to the requirements of the trade where located. Business of 30 years' standing. For terms and full particulars apply to

JAMES S. KUHN, Towanda, Pa.

## For Sale.

## Ten Double Acting Power Punching Presses.

At order. Eight Single Acting Power Punching Presses. At order. Most of the double acting presses are the No.











being convertible designations—has come to the fore front in the most unmistakable and



irresistible manner during the past week. I am not at all surprised at this circumstance—indeed, I have consistently pointed out that the tendency of public opinion in fiscal matters has for at least two years past been steadily and strongly setting in the direction of some sort of revision of our free trade system. In writing thus I have stood almost alone, and have been laughed at and scorned for the alleged singularity of my views and the so-called inaccuracy of my information. The event has justified, and will further justify me in this respect. The current is running somewhat wildly against free trade as it now exists with us, and it is dead against commercial treaties in any form whatever. Three months ago the existence of a reciprocity or "fair-trade" movement in Great Britain was openly laughed at; within the past three days every daily paper in the country has had one or more editorials on the subject. The fact is now duly recognized, simply because it has become a formidable political cry. It has won two seats in Parliament for the Conservatives this week, and has frightened away the Liberals from attacking a third now vacant. In North Lincolnshire the Conservative candidate, the Right Hon. James Lowther, Chief Secretary for Ireland in the last Conservative Ministry, nailed his colors to the fair trade or reciprocity platform, and conducted his canvass as an avowed and open opponent of free trade, as we have it at the present time. His opponent was not an extreme man and was much favored by the moderate Liberals, as well as by some Conservatives, but he utterly failed, and Mr. Lowther wrested the seat from the Liberals by a very large majority. In North Durham, Sir George Elliot did not quite confine himself to this simple issue, but he won the fight and probably owes his success to his anti-free trade speeches. In Cambridge-shire the Liberal candidate has been frightened out of the field because his preliminary canvass has convinced him that he would not have the slightest chance against his opponent who has embraced the fair trade opportunity. These, you will understand, are all chance or "bye" elections. When the time comes for the next general election, however, the campaign will be fought out on this question. The struggle will be most bitterly and offensively conducted by the free traders, but I venture to predict the success of the anti-free traders by an enormous majority. Information in my possession leads me to the conclusion that the hostility to the pet theories of Messrs. Cobden, Bright & Co. is far more general and more determined than is commonly supposed. The farmers are returning to protection—that is the plain title to the new cry—almost en bloc, and their friends and allies, the rural tradesmen, are with them to a man. I have had this feeling pretty well tested on my own account, and I believe it to be just as I have stated here. I do not blame the farmers. They have a right to exist, and if they are wise—which I doubt, taking them as a class—they will push forward this new agitation until they secure a substantial measure of justice from that Parliament which they themselves assist to form. Sir Stafford Northcote, the leader of the Conservative party, spoke on the subject the other evening at Sheffield. I happened to hear the right honorable gentleman, and my impression was that he was trimming his sails to catch the coming breeze, although he has always been accounted a consistent free trader. The Duke of Rutland, Lord Galloway, Earl Wharfedale, Mr. Macleiver, M. P., and other speakers at Sheffield, "went for" reciprocity without any disguise or hesitancy, and were most heartily cheered by a very large audience, mainly composed of local manufacturers. These are indications of what will shortly be apparent. The whole question will be raised afresh, and my impression is that Mr. Bright will not allay the agitation by the simple expedient of terming those who are not of his way of thinking "lunatics." Having said so much, however, I am compelled to say that I, personally, do not quite see how the revision is to be successfully worked out. It may be easy to destroy, but who is to build up the new edifice? I know of no man who is at all equal to the Herculean task; in fact, none of the recognized party leaders seem disposed to make the attempt, so that the promoters of the movement must not only win the battle, but must also provide the new order of things—a sufficiently grave undertaking, in all conscience.

#### PRICES OF METALS, ETC.

The appended figures may be of interest to some of your readers, particularly if used for the purpose of comparison with similar former lists:

	Per ton.
Lead ore, picked, 1 cwt. kegs.	15
Pig lead	12
Tea lead	12
Sheet lead	12
Lead pipe	12
Lead pipe, 1/2 in. inside	12
Lead eucased tin pipe	12
Composition gas tubing	12
Lead wire, 10 No. 12, 13 to 16	12
Hand lead, 28, deep sea leads	12
Improved lead washers	12
Lead nails	12
Tin pipe	12
Bar lead (1 lb. and upwards)	12
Patent shot	12
Hardened shot	12
Tin in ingots	12
Tin bars in 4 cwt. barrels	12
Tin plates, 10 cwt. per box	12
Plumbers' solder	12
Timber's "	12
Brass solder	12
Geol. red lead (orig. packages)	12
Reduced No. 1	12
No. 2	12
Sheet zinc, No. 1 upward	12
No. 2	12
Zinc nails, 1/2 in. upward	12
Hard spelter	12
Remelted spelter	12
Anti-friction metals—Babbitts	12
Feintons	12
Taylors	12
Kingstons	12

#### FOREIGN.

##### FRANCE.

(Monteur des Interests Matériels.)

PARIS, Sept. 4, 1881.—Metals.—Business development normally: Metals are moderately active. Copper is a little lower; Tin a little higher. Lead has given way slightly, while Spelter has been unsettled. We quote the close: Copper—Chili Bars, 154 @ 157.50; Ingots and Slabs, 162.50; Best Selected, 165.25, and pure Corocoro Ore, 157.50. Tin—Banco, 247.50; English Refined, 247.50; Bullion, 246.50, and Straits and Australian, 245. Lead, 32 @ 37.75, and Spelter, 41.50—43 francs per 100 kilos. Iron.—There is no change in the situation at Paris; dealers sell Merchant Iron at 17.50; Thin sheets, firsts, are deducted of half a franc on large lots. The rolling mills decline to deliver Merchant Iron at a less figure than 18.50 @ 19; in this manner the dealers cannot for the moment replace without loss, and this at a time when building is about as active as ever in this city. In the Haute Marne an active demand is kept up, although not quite to the extent of the dealings early in August; makers have slackened production somewhat while the elections were preparing, but will soon resume their output in full. Iron remains firm in the locality; Sheet Iron is in request. Orders for Wire and Wire Nails are on the increase. They quote: Coke Merchant Iron, 19 francs; Mixed, 21; Charcoal Puddled, 21; better quality ditto, 27 @ 29; Machine Coke No. 20, 19; Mixed ditto, 20.50 @ 21; better quality 27 @ 29; Thin sheets, firsts, 20.50 @ 21; one millimeter ditto for Roofs, 22.50; three millimeters English Sheet Iron, 24; Wire, 22 @ 23; Wire Nails, No. 18, in bulk, 27.50. Foundry Pig sells with great ease in the district; and latest furnaces have received large orders. Coal is quiet at Paris; at St. Etienne the period for large contracts for winter supplies has commenced and producers keep prices steady, for the least rise would provoke strikes.

##### BELGIUM.

(Revue Universelle.)

BRUSSELS, Sept. 4, 1881.—Iron.—All products in the line are well held in Belgium. At the late adjudication of old railroad material belonging to the government lines, the French and English paid such high prices that the general Belgian market has been much strengthened thereby. They paid at the time much better prices than American ironmasters were getting for their Pig is quoted here 5.20 @ 6 francs, and Moulage, 7 francs. Various large transactions seem to be on the point of conclusion—among them some for America and India. The Belgian market is quite busy, especially those turning out Sheet Iron. We quote at the close: Merchant Iron No. 1, 22.75; Sheet Iron, 17.50; Corners, 14.75; Beams, 14.50; Steel Rails, 17.50; Steel Hoops, 23.50, and Steel Axles, 22.50. We have heard of a large order recently to the fall season to feel pretty sure that the same will prove an unusually active one, for the general elements in the trade all favor it, activity being great throughout Belgium and Central Europe, especially in everything relating to railroads and building, and as prices are still moderate, there is no hesitation on the part of consumers. While this report is being sent, the Belgium and neighboring countries, orders from the more distant ones are also plentiful, and many instances very large. Metals—Also begin to look up. We quote Copper per 100 kilos, 155 francs; Tin 245.50 @ 250; Lead, 37.50, and Spelter, 42. Coal.—No particular change can be reported, but the market evinces much firmness within the range of 6 to 11 francs. Washed Coke is worth 17.

##### GERMANY.

(Borsenhalles.)

HAMBURG, Sept. 5, 1881.—Iron.—On the lower Rhine and in Westphalia the tendency in the iron market remains favorable, while Coal and Coke are unaltered. In the Rhine local trade is active, the active demand for Luxembourg-Lorraine Pig iron continues; the same thing may be said with reference to Merchant Iron. The Drus Wendell and Dilling have raised the price of Sheet Iron 2 marks. Reports from Upper Silesia are also highly encouraging; Rod Iron has been raised to 125 marks as a basis. The coal mines there have put up the price of fuel 4 marks. Advances from our Austrian neighbors remain cheerful; Pig iron advances in price in Austria, although the dealings are only moderate in extent. Bar Iron has become more active, and the market has been lifeless here. Lead is only moderately dealt in. We quote: English Pig, 16.50; ditto Sheets, 16.75 @ 17.50; German ditto, 15.50 @ 16.50; and Spanish, 15.50 @ 17.50. Copper is firm. We quote: Dronthout Borsas rooster, 67 @ 68 marks; Wallaroo Blocks, 60; Electrotyp N. A. in Slabs, 74 @ 75; Lake Superior, 76 @ 77; and English Refined, 66 @ 67. Tin is quiet, and English Refined at 100 @ 102, and other sorts at 90 @ 100. Nothing transpires in Spelter. We quote Silesian, 15.75 @ 16 marks per 100 kilos, on the spot and to arrive.

##### AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Sept. 4, 1881.—Iron.—Good progress can be advised in the iron trade in this vicinity, especially as regards Merchant Iron, which has led to a great many fresh transactions. From Bohemia, it is true, complaints are frequently heard about the difference in price between Bohemian and Styrian iron, in consequence of the reluctance of Styrian makers in advancing the price, which causes the Bohemian make to be neglected; but the fact is that Styrian iron is intrinsically better and has a special line of custom, so that in reality it does not interfere much with Bohemian. The combined Steel Rail works have at length made a bargain with the government, and sold 11,000 tons for the Arberg line and 4700 for the Rodolphus Railroad at 11 florins at the works, deliverable all the way to September, 1883. Structural iron is in request, especially Pillars. Stocks are light. Thick Sheet Iron is also wanted. The Hüttenberg works, the Egydi-Kindberg, the Styrian and Vörsberg-Kottach companies have resolved to liquidate and join the Alpine works consolidation. Hardware sells readily. We quote at the close: Pig Iron, 44; Gray ditto, 46; Bessemer, 48 @ 52 at the works; Merchant Iron, 115 @ 118; Bohemian ditto, 100 @ 102; Sheets for locomotives, 175 @ 180; ditto for roofing, 150 @ 155; ditto for boilers, 165 @ 170; ditto for tanks, 150 @ 155; and beam, 160 @ 165 florins per ton at Vienna. There is a slightly improved tendency in Metals. We quote: Copper, 168; Tin, 240 @ 250 florins per 100 kilos; Tin, 175.50 @ 178; Antimony, 72; Lead, 17.50 @ 18; Spelter, 42 @ 45; Nickel, per kilo, 45; Bismuth, 21.50, and Zinc White, 33 @ 45.

##### CHILI.

(Weber & Co.)

VALPARAISO, July 10, 1881.—Copper.—Before the last mail left we sold a few small lots on shore here at \$18.70 to ballast a few small lots, then there were offered in vain some small parcels of Chancal and others on board at \$10.10. Sales were thus restricted to 677 quintals Copper at \$18.70, and 16,000 quintals Bismuth at \$18.35 on board. Nitrate, in response to better European advances has been unusually active, so much so that this must be added the circumstance that during the month of September next, the export duty free, from Tattai will terminate, and that the export from there will dwindle down to very little until the railway is built in the Tapa-pa region, on the other hand, production increases, though slowly, but vessels are waiting to load to a larger export. Although we are now fully on European demand, the demand continues unabated. Sales for the fortnight, 65,000 quintals at \$23.25 @ \$24.40 for 95 % and 96 %. Since the instant the Nitrate charters have amounted 13,500 tons for Europe, and 2100 for the United States with option to Europe, and 3500 besides for the United States direct.

TOTAL EXPORT FROM JANUARY 1 TO JULY 1.

	1881.	1880.
To Northern Europe	2,194,970	1,807,453
To the Mediterranean	8,902	22,933
To the United States	471,295	320,228
Atlantic	57,119	62,658
California	57,119	62,658
Total	2,731,586	1,913,072

Freights.—Vessels are extremely scarce; there are unengaged only 6700 tons here.

#### EAST INDIES.

(Gilfillan, Wood & Co.)

SINGAPORE, Aug. 4, 1881.—Tin.—The market opened at \$3 and slowly advanced until three days ago, when quite an active demand set in, owing to the July deliveries in England and Holland having been large. The price touched \$3.20 per picul, but the bulk of the business has been done at \$3.15 @ \$3.20, which is the closing quotation. Settlements during the fortnight aggregate 470 tons, and of this a good deal we think is destined for the United States. Freight is again rather lower, but would now appear to have touched bottom. For New York the Mindet and Don Enrique continue loading. The American ship Elwell has been placed on the berth, but so far has engaged but little cargo. For Boston the Nohemial Gibson has cleared and has been followed on the berth by the American ship H. G. Johnson. Exchange is quoted 3/16 for six months' sight private bill on London. Tin shipments from the Straits settlements to the United States, seven months, 1880, 41,137 piculs; 1881, 25,116; 1879, 56,065; 1878, 27,785; 1877, 32,903; 1876, 26,607.

(Schmidt, Kustermann & Co.)

PENANG, July 30, 1881.—Tin.—The market opened at \$3.40, at which there were some buyers for China, but it subsequently gave way to \$2.75 @ \$2.77.50, when a lively demand again sprang up for the East, causing a recovery to \$3.10, to-day's closing figure. Sales sum up for the week some 5750 piculs, of which Europeans took 1750 piculs, and Chinese 4000; this includes 400 piculs resales. Stock now reduced to 100 piculs. Exchange—At first rising, advanced to 3/16, but later on declined to 3/16, the closing quotation for 4 months' sight bank.

(Hessener & Co.)

COLOMBO, Ceylon, Aug. 4, 1881.—Plumbago.—A small business has been done in this mineral at the ensuing quotations, per ton: Ordinary lump, 110 @ 115 rupees; Chips, 60 @ 70; and Dust, 40 @ 50. Shipments to all quarters from October 1 to August 21, 1881, 25,320 cwts.; 1880, 17,544; 1879, 11,054 cwts.; 1878, 21,764. Exchange—Six months' sight, 1/8.

The large caisson in the working shaft of the Hudson River Tunnel, at the foot of Morton street, this city, after having been sunk 16 feet, has been stopped by the tide-water breaking through under the iron shoes, and flooding the chamber to the depth of 6 feet. The break under the caisson is due to the nature of the earth in which the men have to work and to the nearness of the shaft to the river. Although the caisson weighs 400 tons, it is not near heavy enough to pass through the earth, and 100 tons of railroad iron will be placed on the top to force it down. The caisson is the largest working chamber for underground work ever built, and after the air-lock has been put in and the railroad iron placed on top, it will weigh nearly 600 tons.

An electric lamp on the roof of Metropolitan Garden, in this city, was carelessly handled by a man named Thomas McDonald, who attempted to regulate it, when he received such a shock that he fell to the earth below, dying instantly.

#### INDUSTRIAL ITEMS.

##### MAINE.

Manufacturing at West Waterville is very lively. The Dunn Edge Tool Company have built extensively the past year on their dam. The Hubbard & Blake Company are erecting a new scythe and tool shop. The corn canning factories of J. Winslow Jones & Co. are nearly finished. The new enterprise gives employment to 200 persons. The Bangor Edge Tool Company have received an order from a lumber party in the West for 700 Peavy cant dogs and 50 dozen chopping axes.

##### NEW HAMPSHIRE.

The Sibley Scythe Company, at North Newport, have enlarged their business, J. M. Morse, of Maine, having bought an interest in the firm. They are turning out 15 dozen a day.

##### MASSACHUSETTS.

Jerome Wheelock, of Worcester, manufacturer of the Wheelock engine, which took the medal at Cincinnati last year, is driving day and night. It is understood that he will very soon build a large manufactory, capable of accommodating his business.

The Pomeroy Iron Works, West Stockbridge, go out of blast this week. The present company running the works leased them for two years, and their lease expires this fall. They will not renew it. There is a rumor that a new company will lease the works and continue the business.

The Co-operative Cutlery Co., at Greenfield, are turning out double the amount of work done a year ago. They now occupy the whole of the buildings of the Greenfield Power Company, and employ 60 men.

The Lathe & Morse Tool Co., of Worcester, are building a new shop, 181 x 55 feet. It will be ready for occupancy by October 1.

The Messrs. Reed, cast manufacturers, are preparing to put in a furnace and machinery for rolling zinc and copper in their building in East Bridgewater. Later they will erect a building, 100 x 70 feet, for the heavier parts of their work.

The Wheeler Foundry Co., of Worcester, is doing a very fine business in the manufacture of annealing pots for wire manufacturers, as well as a large amount in furnishing castings for builders of steam engines; the castings for the Wheelock engine come from the shops of this company.

There are now 350 hands employed at the Haydenville Brass Works, and the village was never so prosperous as to-day.

##### RHODE ISLAND.

The Nicholson File Company, Providence, are erecting a new shop. Power will be supplied by a Harris-Corliss engine. The new shop is to be used generally for their works, and for the manufacture of such specialities as the company may from time to time put upon the market.

##### CONNECTICUT.

The Pratt & Whitney Company, Hartford, are finishing a lathe whose length of bed is 38 feet, and is cast in two sections of 19 feet each and bolted together. It has a feed screw and leading screw, one 35 feet and the other 33 feet long, 4-inch pitch each. The lathe has two sets of heads, one of which may be removed at will, and also two tool carriages.

##### NEW YORK.

The Chrome Steel Works, in Brooklyn, are running full time and shipping heavy orders of tool and spring steel.

It is stated that the liabilities of Fred. Sterling, 7 and 9 Cliff street, are \$100,000. This firm were the agents of the Pocasset Iron Works, of Pocasset, Mass., of which Henry S. Sterling was the president and virtual owner, as he had \$49,800 of the capital stock of \$50,000. The iron works were established in 1824, and the present company was formed in January, 1878. It is not yet known how much the affairs of the company are involved.

##### PENNSYLVANIA.

The Scott foundry has been in operation day and night all summer. Some of the employees have worked 52 days in a month, by working overtime. The last platen and bed plate of the five cotton presses were cast last Saturday, when some 25 tons of iron were melted. The last cylinder will be cast in a few days. Condemned cannon, some weighing nearly 6000 pounds, are put whole into the reverberatory furnace and melted.

Stauffer, McKnight & Co., of the Mt. Penn Stove Works, Reading, made their first shipment of a carload of stoves yesterday.

The Hollidaysburg Iron and Nail Company's rolling mill has run continuously since the second day of June without stopping for repairs, which is a remarkably good run.

Fairchance Furnace, which was banked up last week because of the scarcity of water, has resumed operations.

The enforced suspension in the coal regions, owing to the scarcity of water to run the motive power at the collieries, still continues. The only water used at a majority of the collieries that are not using mine water is transported to them in tanks, which, besides the inconvenience, adds greatly to the cost of mining. Notwithstanding this, every colliery that can be worked is kept up to its fullest capacity. The great fear is that an enforced suspension will be necessitated by the giving out of the present sources whence water is obtained. If rain does not come very soon, one-half of the collieries in the Schuylkill region will be stopped, and in view of this threatened state of affairs, everybody is eager to get all the coal possible while water lasts.

For the 10 days ending September 10, the shipments of slate from Slatington and vicinity were as follows: Roofing slate, 3516 squares; school slate, 1115 cases; blackboards, 106 cases and 17 pieces; flagging, 14 cases and 115 pieces; mantels, 25 cases. The shipments of roofing slate from January 1 to September 1 were 64,868 squares, and for the same period the shipments of school slate were 20,384 cases. During the last month roofing slate has advanced \$1 per square.

Dr. S. M. Royer informs us that he is now engaged in putting in a new hearth and inwall at his Rebecca Furnace. The furnace will blow in on charcoal iron in a few days.

A printed notice has been recently circulated, of which the following is a copy:

August 24, 1881.

By request of a majority of the manufacturers of fruit jars belonging to the Eastern Vial and Bottle Manufacturers' Association, we have this day withdrawn all our molds, and none will be used for the production of jars during the month of September.

CONSOLIDATED FRUIT JAR CO.,

49 Warren street, New York.

##### HERO GLASS WORKS.

Gaul and Adam streets, Phila.

The proprietors of the Pine Iron Works, Messrs. John L. Bailey & Co., broke ground on the 13th for a new rolling mill at Mantawney Station, on the Colbrookdale Railroad. Work will proceed on the new mill as fast as possible.

The new mill of the Catasauqua Manufacturing Company was tested on Saturday, preparatory to its going into operation. Everything worked well, and to-day it runs to its full capacity.

There is a boom in the construction of individual coke cars just now, consequent upon the scarcity of company cars. The Connellsville Machine and Car Company have built upward of fifty during the past couple of months, and have orders now for sixteen.

Wm. M. Kauffman & Co. have blown out the smaller of two Sheridan furnaces on account of a chill it had some time ago. It has not worked satisfactorily since then. Rebuilding will be at once begun, and it is expected to be in working condition in a short time.

Blast furnace No. 1 of the Reading Iron Works will be blown in about October 1.

Six new cars a day are now turned out by the Bellefonte Car Works.

Edwin Harrington & Son, northwest corner Fifteenth and Pennsylvania avenues, are shipping their portable double-chain screw-boasting machines and pulley blocks to all sections, including South America, France, Germany, Russia and China. A large number of these hoists are sold in Europe. They are making a specialty of these hoists and blocks, manufacturing them of 14 sizes, ranging from 500 to 20,000 pounds.

Stokes & Parrish, Thirty-first and Chestnut streets, Philadelphia, have recently filled several orders for elevating machinery, and have orders in hand for several of the store and warehouse buildings now in course of completion. Their works are running full handed on full time.

The Emaus Furnace, the property of the Philadelphia and Reading Coal and Iron Company, was blown in on the 12th, and will henceforth be operated by Messrs. John Donaldson and W. Thomas, of Philadelphia, and Colonel H. H. Fisher and Mr. George Ormrod, Fisher & Co. The furnace has been put in first-class condition.

The Star Lock Works, of Philadelphia, the proprietors of which are Messrs. Hillebrand & Wolf, are well known as being among the oldest and most important concerns of the kind in the country, having been established as far back as 1836, and always having turned out a very superior class of goods. They have recently made some very handsome improvements in the exterior of their premises, including an elegant French plate glass bulk window measuring 100 x 103 inches. The works, at 110 South Eighth street (and Samson between

Eighth and Ninth), are in the very center of the city. Adjoining them is the Times Building, and just around the corner, so to speak, are the Girard House, the Continental Hotel and the new Post Office. The premises occupied consist of four floors and basement on an L-shaped structure, fronting on both the thoroughfares named above. It is needless to say that there is a splendid equipment of the latest and most improved machinery. About 10,000 locks in twenty-eight different patents and in hundreds of styles, the mechanism being of their own invention, are turned out daily. These locks go all over the United States, into Germany, England and various other foreign countries, and are everywhere recognized as the very perfection of this class of mechanism. The firm evidently take a great pride in the well-known renown of their productions, and the most rigid supervision is incessantly kept up in order to guard against the possibility of anything imperfect ever leaving the establishment.

Messrs. Schleicher, Schumm & Co., the only manufacturers of gas engines in this country, at No. 3045 Chestnut street, Philadelphia, are putting up, at the northwest corner of Thirty-third and Walnut streets, a three-story structure, 50 feet front by 206 feet deep, which will enable them to increase their working capacity threefold. This improvement, it is expected, will be completed in time for the removal of the works from their present location to the new one before the end of the year. As soon as the spring building season opens, it is said to be the intention of the firm to erect additional buildings on the lot, which is 120 feet by 266 feet. This firm now gives employment to about 80 hands, the full force the present works have a capacity for, and, owing to this restricted area, they are now four months behind in their orders, notwithstanding the fact that they have been compelled to import some of the engines to supply pressing demands.

##### PITTSBURGH AND VICINITY.

The Fort Pitt Boiler Works are just shipping to the Edgar Thomson Steel Works something very considerable in the way of boilers. They are 20 in number, and are each 53 feet in length and weigh 22,000 pounds apiece. They are of Singer & Nimick homogeneous steel, and are destined to supply steam for the blast engines of furnaces "D" and "E" of the Edgar Thomson Steel Works. They will be erected in five batteries of four boilers each.

The glass works of Ihmsen & Co., on the South Side, were visited by a destructive fire on the morning of the 18th. The fire was caused by the explosion of an oil tank on the premises of Oliver Bros. & Phillips, and quickly communicated itself to the warehouses of Messrs. Ihmsen, one of which, together with the stock it contained, was entirely destroyed and the other partly destroyed. The loss is stated at from \$12,000 to \$18,000.

An artesian well is being drilled at the Pittsburgh Forge and Iron Works, the purpose of the firm being to furnish water for the boilers from the well instead of from the river as heretofore.

Manufacturers of iron tanks for oil storage report that the business is falling off. One gentleman, who has a contract to make several large tanks for the Standard Oil Company, says that they want to get out of it, as they have no oil to store in them.

##### VIRGINIA.

Callie Furnace, in Botetourt County, is out of blast on account of a lack of water.

L. J. and Selina furnaces, of the Longdale Iron Company, are both in blast and are making between 60 and 70 tons a day.

The Virginia Iron and Steel Association is at work constructing its large furnaces, near Josken, Rockbridge County, and not at the site of the old California Furnace, as was previously intended.

##### OHIO.

Mr. E. McMillin, formerly of the Crescent Iron Works, at Pomeroy, has made some valuable geological discoveries while prospecting for the proposed line of the Ohio River Railway in Lawrence County. He has demonstrated the existence of a new and very valuable vein of coal, which has been opened in some places, but has always been supposed to be part of an old and well-known vein. He has also developed some new facts regarding the ore deposits.

The Youngstown Car Works are working constantly with a large force of men. Mt. Vernon Furnace is running, and making 14 or 15 tons of good warm blast per day.

The Motherwell Iron Works, Lancaster, will be removed to Logan, in the Hocking Valley. The Lancaster property was valued at \$12,000, and the citizens of Logan subscribed \$20,000. The works will be operated by an incorporated company. The main building of the works will be 200 x 50 feet, and the work of erection will be commenced at once.

The Buckeye Engine Company, Salem, will furnish a 150-horse power engine for the Brush Electric Light Company at the Chicago Exposition.

Olive Furnace is running, doing well, and is making 14 or 15 tons of warm-blast iron per day.

The Girard Iron Company, Niles, have leased the Thomas Furnace Company's furnace at this place for a term of years. It will be run in connection with the Girard Furnace.

The Cleveland Car Works have orders that will keep them busy for two years. Buckhorn Furnace has been banked up since June, and will probably remain so for a while.

The Cleveland City Forge and Iron Company are building new works, fronting on Case avenue, having a frontage on the same of 80 feet and extending back 1400 feet. They contemplate also several additional buildings. They expect to occupy the works some time next year. They employ 250 hands, and report trade exceedingly good.

The Akron Iron Company are putting in a new engine and a new polishing machine, to increase their production of hot polished shafting. Both engine and machine will soon be in operation.

The new pump works of the John H. McGowan Mfg. Co., at Cincinnati, are now equipped with machinery of the most ap-



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One Griffin Blade will outwear four of the best Paris or any six of the American Blades.



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MESSRS. PERRY MARSH & CO.—GENTS: I do a great deal of fret sawing, and have used many kinds of blades, but I find the Griffin Blades the best. I find that they cut more than twice as fast as the best Paris blades, and will last about four times as long. Yours truly, HENRY J. SCHANCK.

We have hundreds of letters from those using the Griffin Blades, which speak of them in the highest terms.

We are the sole agents for these blades in New York. If you do not find them at the hardware stores, we will send them to you at the following prices, postage paid:

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No. 7 to 10 inclusive, 20 cents per dozen, or \$1.50 per gross, with the usual discount to dealers. If fifty gross are ordered at one time we will furnish with them a nice case with partitions for each of the ten sizes.

We have a full stock of Lester, Rogers and Cricket Saws, Wood, Designs and all things else in the bracket sawing line.

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STEELE & SONS' Wrought Handle Sad Irons.

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**KYSER & REX,**

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Main Office and Factory, Trenton Ave. and Margaretta St., Frankford, Philadelphia.  
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NEW BEDFORD, MASS., Sole Manufacturers of  
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All Tools exact to Whitworth Standard Gauges.  
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We are constantly receiving orders from over thirty of the principal export houses of this city for all kinds of

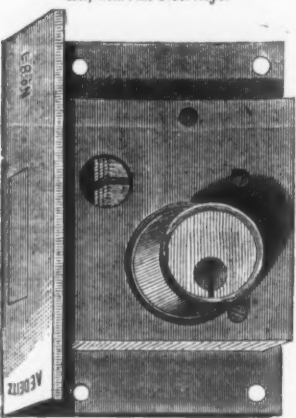
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Railroad Materials, &c.,

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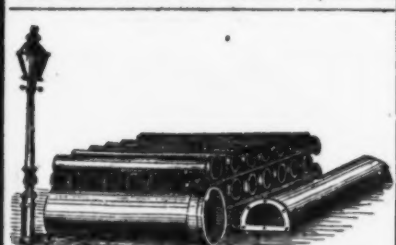
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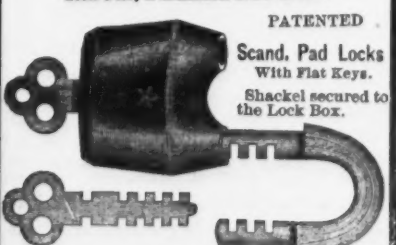
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FOR WATER AND GAS,  
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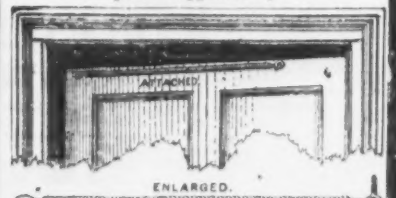
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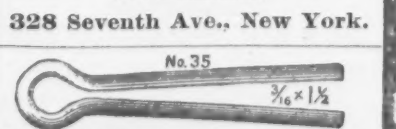
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### **PATENT Screw Wrenches**

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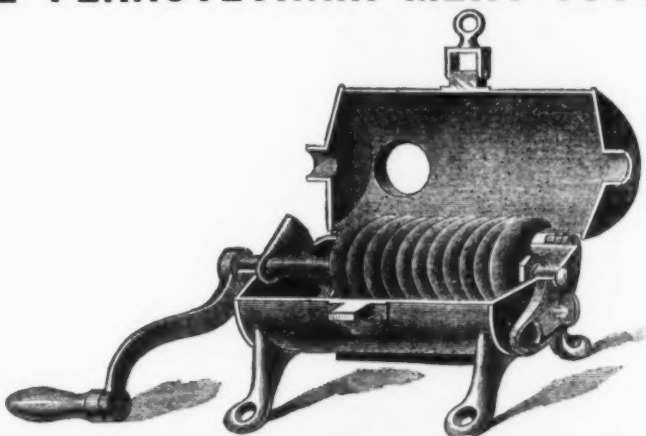


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proved pattern, and is in full operation. These works are increased to fully double their former capacity. Some of the new additions in machinery, including a fine engine and elevator, were built by the company in their own shops. The new works are situated on Central avenue, below Second street, comprising a substantial three-story brick building with a fine basement, the whole having a wide frontage on Central avenue. The elevator in the building is driven by hydraulic power operated by one of the "Rival" pumps, and is worked with great ease and facility. Large orders for the "Rival" are being completed with rapidity, while other pressing orders are waiting their turn.

**GEORGIA.**  
Bibb Furnace is making between 17 and 20 tons of iron per diem.

**KENTUCKY.**  
Pennsylvania Furnace will probably have her new hearth completed in time to start up by October 1.

**ILLINOIS.**  
The Chicago, Burlington & Quincy Company will further enlarge their works at Aurora by the erection of two large buildings forthwith.

The Columbian Iron Works are building for the North Chicago Rolling Mill Company's Works, at South Chicago, an automatic cut-off engine, and have also under contract 200 car axles for F. W. Cory & Co. Charles F. Elmes, of Chicago, is building a 17-ton Willard steam hammer for the Cincinnati Steam Forge Co.

The new works at South Chicago, of Willard, Sons & Bell, proprietors of the Chicago Steam Forge Works, will be 250 by 60 feet. Several thousand dollars worth of new machinery will be added, and it is expected that the works will be in running order by Dec. 1.

J. H. Bass, manufacturer of car wheels and general castings, employs 300 hands on full time, and the works are full of orders for the next 60 days.

The Chicago Rawhide Belting Co. are shipping about 10,000 feet of belting weekly. They are also making some heavy shipments to the New England States. They report they are full of orders and somewhat behind. They have also supplied the Mechanics' Exhibition in Boston with all the belting required, also the exposition to be held in Chicago from the 7th inst. to Oct. 22.

**INDIANA.**  
The Atlas Engine Works, Indianapolis, have placed in the Cincinnati Exhibition one of their standard slide-valve engines. It makes 225 revolutions per minute, furnishing power for electric lighting. It shows great regularity of motion and smoothness of running.

Subsequent to a judgment rendered by the last Greenup Circuit Court in favor of K. B. Graham, sustaining his attachment of the Iron Hills Furnace and lands, an equity proceeding was instituted by him this week to enforce a sale of this valuable property.

Everything about the A. C. and I. Railway Company's furnace is in splendid working condition. The furnace still continues to turn out an average of 50 tons daily of superior iron, using only raw coal for fuel. The furnace is well stocked with all the necessary raw material, and is getting heard full of iron.—*American Manufacturer.*

Hunnell Furnace has been running rather irregularly lately, on account of scarcity of water.

Estill Furnace has been blowing since June 1, and is making about 7 tons of car-wheel iron per day.

All departments at the Norton Iron Works are in full blast, and everything is in fine working order. The furnace is making her usual amount of iron, and the nail factory the usual amount of nails. The excessive heat during last week and this has prevented a number of the men from working full time.

**MICHIGAN.**  
The following table from the Marquette Mining Journal, exhibits, in gross tons, the total lake shipments of iron ore the present season, up to and including Sept. 7, together with the amount shipped during the corresponding period last year:

Where from.	1880.	1881.
Escanaba.....	790,524	941,193
Marquette.....	461,313	470,000
L'Anse.....	37,535	35,011
Total.....	1,291,472	1,446,143

An increase of 154,714 gross tons. In addition to this there was shipped pig iron, ore and quartz, as follows:

Pig Iron.	Quartz.
Carp River Iron Co.'s furnaces.....	4,926
Pioneer Furnaces.....	992
Total pig iron.....	5,828

Total ore, pig and iron and quartz..... 25,608

We hear that the Crystal Falls Iron Company propose to build a furnace at that place.

The Florence Furnace will be ready for business by November 1st. Stack No. 1 of the Jackson Iron Company at Fayette, did not blow in on the 30th of August, as we were informed, and as we stated in our last issue, but did blow on Saturday, Sept. 3. It was intended to have started on Tuesday, but unforeseen delays prevented.

The packing house of the Lake Superior Powder Company's Mills, near Marquette, blew up on Tuesday week, destroying the building utterly, and killing eleven men who were employed in or about it. The noise and shock of the explosion was heard and felt at a distance of eight to ten miles away. Nothing whatever is known of the cause of the explosion.

Horrock's machine shop and foundry, at Menominee, is being rebuilt rapidly.

**MISSOURI.**  
The Smith, Beggs & Ranken Machine Company have occupied their new addition, and are full of orders.

The Whitman Agricultural Company now have their extensive new works, at Eighth and Clark avenue, in operation, turning out large numbers of implements and machines. These works occupy 256 feet front on Eighth street and 128 feet on Clark avenue; three stories high, with basement, and additional forge shops, foundry, pattern rooms, &c. The new establishment is well arranged to economize the handling of the various parts of the implements manufactured, and is of more than twice the capacity of their old works. We learn the company now have a large number of orders on their books, but have room for more, and will make every effort possible to fill promptly all orders they may be favored with.—*St. Louis Age of Steel.*

Kiefer & Co., late of Newport, Ky., have removed to St. Louis and reorganized under the name of "Standard Tool Company." They will have largely increased facilities for manufacturing their full line of goods, embracing in part, as specialties, picks, mattocks and grub hoes; also mining tools of all kinds of the best quality.

St. Louis is to have new water works engines. They will cost \$120,000.

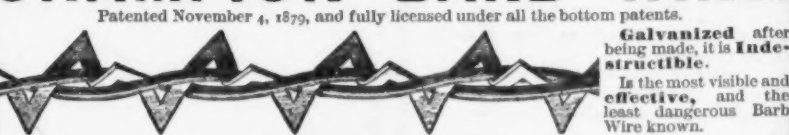
The Groom Shovel Company are full of orders, and are now turning out 60 dozen shovels per day.

**H. H. COLES & CO.,**  
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**NEW CHUCKING DRILL REST.**  
It will hold all sizes of drills up to 1 1/4 inches. Price 60 Cents.

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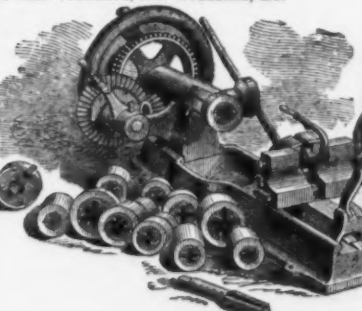
Ground Emery, Corundum & Flint, Glue & Curled Hair, Hair Felt, & Felt-  
ing for Covering Boilers, Pipes, &c., Cow Hide Whips.  
Stores: PHILADELPHIA, 730 Market St.; BOSTON, 143 Milk St.;  
NEW YORK, 67 Beekman St.; CHICAGO, 182 Lake St.

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**Lighting Screw-Cutting Machinery and Tools,**

Bolt Cutters for hand or power; Lighting Screw Plates, cutting from wire sizes to 1 1/4 in. Screw Plates for Threading Gas Pipe; Taps, Dies and Reamers for use in the Bit Brace; Tire Bolt Wrenches, Nut Wrenches, &c.



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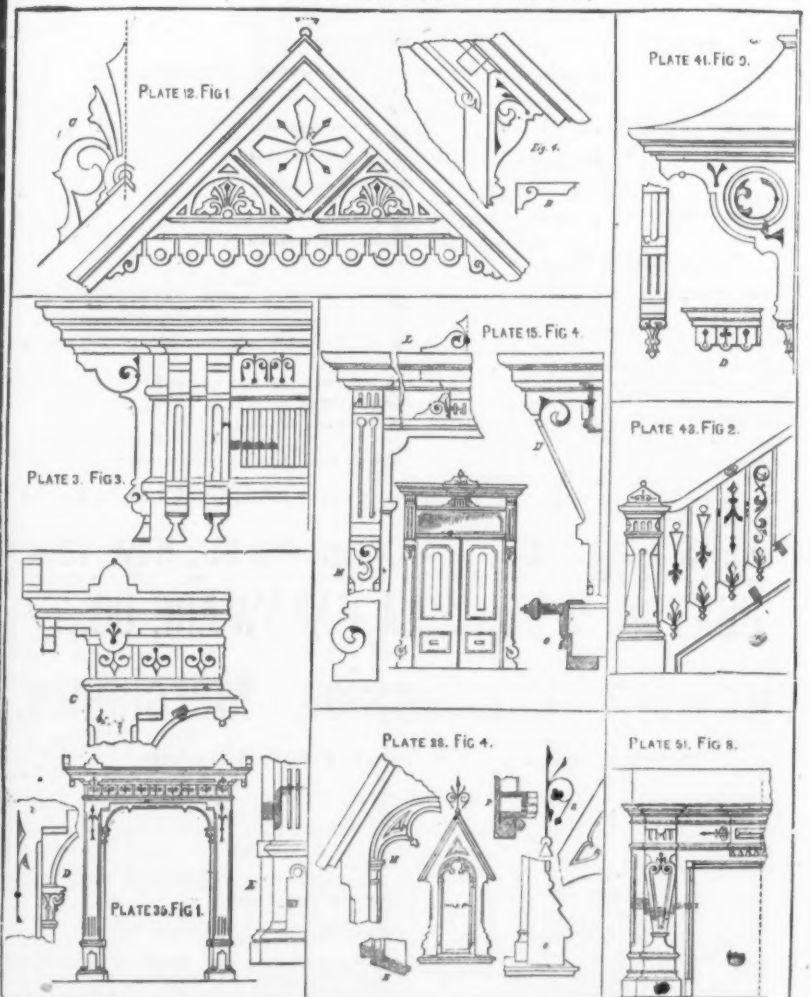
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By M. F. CUMMINGS, M. A., Architect.

Associate Author of "Architecture, by Cummings & Miller."

(CUTS REDUCED FROM PLATES INDICATED.)



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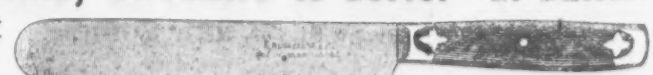
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Trenton Iron Co., Trenton, N. J. .... 2  
Washburn & Moen Mfg. Co., Worcester, Mass. .... 2  
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Leslie A. C., Montreal, Canada .... 4

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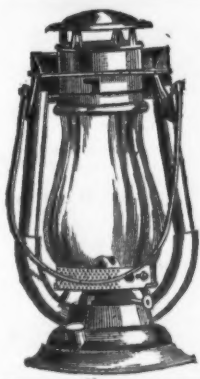
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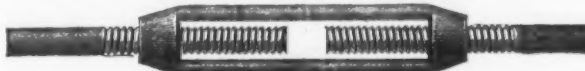
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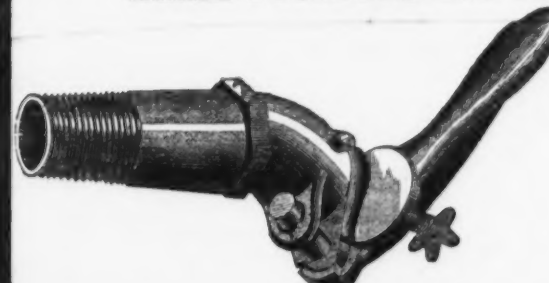


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At a session of the Circuit Court of the United States for the Eastern District of Michigan, held at Detroit &c., on Wednesday, the 8th day of December, 1880.

NELSON LYON

against

GUYTON T. FISHER, et al.

It is ordered, adjudged and decreed, that the act entitled "An act for the relief of Nelson Lyon and Jerome S. James," passed by Congress and approved April 1, 1870, &c., is a good, valid and constitutional act.

That the original patent, bearing date July 9, 1872, and numbered 128,449, granted and issued to Joseph Barsaloux, Jeremiah S. James and Nelson Lyon, when corrected by the Acting Commissioner of Patents, as directed by said act, was a good and valid patent.

That the said Joseph Barsaloux was the original and first inventor of the improvements in metallic stiffeners for boots and shoe heels mentioned and described in said letters patent.

That the said Nelson Lyon is the assignee of said Joseph Barsaloux, and is entitled to the benefit of said patent.

That the said Nelson Lyon is the exclusive possessor of said letters patent and the invention thereby secured.

That the defendants, G. T. Fisher & Co., and each of them, have infringed upon the said patents and upon the exclusive rights of said Lyon under the same.

That said Lyon receive of said defendants all the profits, &c. they have made, and in addition thereto all the damage he has suffered by reason of the infringements by the defendants, and also the costs, charges and disbursements in the action.

It is also further ordered, adjudged and decreed, that a perpetual injunction be issued against said defendants, according to the prayer of the said complainant's bill.

You are also hereby notified that the perpetual injunction has been issued and served on the defendants.

All questions as to damages and settlements in relation to infringements under my patents must be addressed to and made with my attorney, **WILLIAM H. KING**, in my care at the above address.

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See Page 3.

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And grades of Steel specially adapted for Lathe Tools, Chisels and Taps and Dies.  
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**THE PATENT**  
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With which the Sashes work as  
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 Bridge Iron, Iron Beams, Channel Bars, Car Truck Channels, Angles, Tees,  
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 Special attention given Unusual Shapes and Sizes.  
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**MERCHANT BAR, FISH PLATES, PIG METAL,  
 IRON RAILS & BESSEMER STEEL RAILS.**

Present Annual Capacity of these Works.	13,000 tons
Merchant Bar	40,000 "
Pig Metal	100,000 "
Iron Rails	110,000 "
Steel Rails	100,000 "
Total Capacity per year.	463,000 "

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We invite the attention of RAILROAD MEN especially to our make of **SPLICE BARS** and **Track Bolts**. Using the best brands of **REFINED IRON**, and paying close attention to the finish of our manufactures, we are enabled to offer our patrons **BOLTS, NUTS, SPLICE BARS, &c.** of excellent quality. Our works have been enlarged within a few years; all orders are now executed with promptness; all our work guaranteed.

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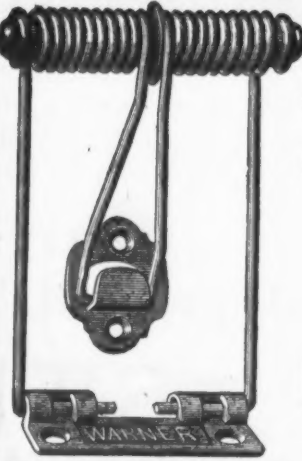
**PIG IRON AND NAILS,**

Manufacture the Celebrated Brand of

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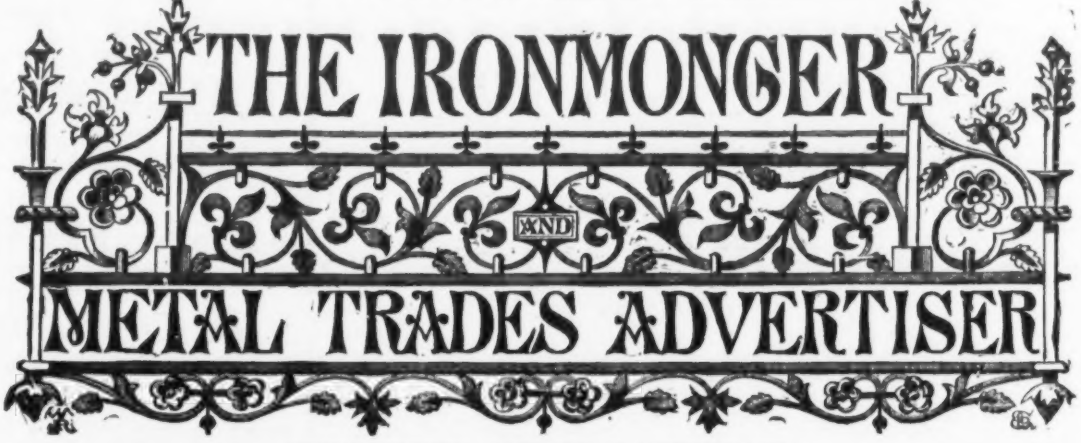


are the most simple, most effective and most convenient ever introduced, and the immense sale we are having shows their great popularity and superiority.  
 There never was a Spring made that is so durable, so complete in its action, operating with a uniform pressure, holding the door tight when closed, and allowing it to open without increasing the pressure at any point.  
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 The Spring is easily unhooked and rehooked—in an instant—from the door and also from the jamb, without removing a screw or pin.  
 This is a Convenience Possessed by no other Spring in the Market.

We are making this season three sizes, viz:  
 No. 1 For Screen or Light Storm Doors.  
 No. 2 For Medium Doors.  
 No. 3 For Heavy Doors.  
 They are for sale by most of the prominent jobbers of the United States and Canada.  
 Correspondence solicited.

**FREDERIC BARTLETT,**  
 FREEPORT, ILLINOIS.

ESTABLISHED IN 1859.



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 OCTOBER 8, NOVEMBER 6, DECEMBER 3 and 31, 1881, JANUARY 28, FEBRUARY 25, MARCH 25, APRIL 22, MAY 20, JUNE 17, JULY 8, AUGUST 5, and SEPTEMBER 2, 1882.  
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**THE WHOLE FOREIGN HARDWARE TRADE,**  
 so far as our experience of twenty years is concerned, will be covered by *THE FOREIGN SUPPLEMENT* at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and *FOREIGN SUPPLEMENT* is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.



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Established 1845.  
Office, foot of Houston Street, East River,  
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Twenty-third Street,  
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Twenty years' practical Experience.

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ESTABLISHED 1855.  
Successors to JOHN R. WATSON, Perth Amboy, New Jersey.

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FOR ROLLING MILLS, BLAST FURNACES, FOUN-  
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ESTABLISHED 1845,  
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Island Kaolin.

Established 1864.

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MILLER'S BRICK PRESSES  
(Established 1845).

FIRE AND RED BRICK,  
And Brickmakers' Tools in General.  
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KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

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## DISSTON'S SAMSON TREE PLANTER AND POST HOLE DIGGER.

Fig. 1.

Patented May 29, 1870.

Price, - - - \$37.50 per dozen.

Fig. 2.



No Farmer, Nurseryman, Railroad  
or Telegraph Company  
SHOULD BE WITHOUT ONE.

NO BACK-ACHE.

NO KNEE-WORK.

NO CLOGGING.

This tool has been thoroughly tested, and has given  
the greatest satisfaction to all who have tried it. The  
principle on which it works makes it self-cleaning and  
prevents adhesion in sticky soil; therefore it always  
works free and easy. It is far superior to all plungers,  
augers and boring machines, as it works well in stony,  
sandy, or clay soils; quicksand under water is as easily  
removed as though no water existed.



### DIRECTIONS.

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as shown  
in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with one  
hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by simply  
pressing down the lever, which will open the blades and the dirt will fall from between them. The Digger is then ready for another  
plunge. The steel blades are nine inches long, and the whole tool five feet long. For sale at Hardware and Agricultural Stores.

HENRY DISSTON & SONS.

## STANDARD SHAFT COUPLING SPRING.

CHICAGO, ILL.  
July 24, '91.  
Gentlemen:  
You may enter  
our order for  
5000 sets of your  
Standard Shaft  
Coupling Springs  
(400 sets a month).  
A. A. ABBOTT  
& CO.

Side View.  
One dozen pairs, japanned,  
expressed to the responsible  
hardware or carriage  
trades for \$1.50 (per gross,  
out 30 days, 10% cash, 10%  
discount to jobbers. Splen-  
did selling article for com-  
mercial travelers. (Nickel-  
plated springs \$3 per doz.,  
pairs. Dealers and the  
trade also supplied by the  
E. D. Clapp Mfg. Co., Au-  
burn, N. Y., and Wilcox &  
Barnes, Birmingham, Conn.;  
Crandall, Stone & Co.,  
Hills, Carriage Trimmings,  
Binghamton, N. Y.;  
Perfect Anti-Rattle and Shaft Bolt Locker, and looks  
neat on a buggy. Sold by all hardware dealers every-  
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Perfect Anti-Rattle and Shaft Bolt Locker, and looks  
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Williams' Patent,  
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Fire level. Accumulation of cinders impossible.  
No cleaning out of fires during the day. Parts  
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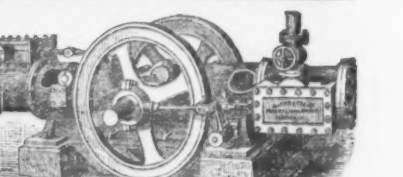


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Over 250 lbs.	110
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Lots of 10 to 25 dozen special prices.	
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Stanley.	100
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Shaper.	100
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Huffer's.	100
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Socket Framing.	100
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2 1/2 to 3.	3.25
3 to 3 1/2.	3.50
3 1/2 to 4.	3.75
4 to 4 1/2.	4.00
4 1/2 to 5.	4.25
5 to 5 1/2.	4.50
5 1/2 to 6.	4.75
6 to 6 1/2.	5.00
6 1/2 to 7.	5.25
7 to 7 1/2.	5.50
7 1/2 to 8.	5.75
8 to 8 1/2.	6.00
8 1/2 to 9.	6.25
9 to 9 1/2.	6.50
9 1/2 to 10.	6.75
10 to 10 1/2.	7.00
10 1/2 to 11.	7.25
11 to 11 1/2.	7.50
11 1/2 to 12.	7.75
12 to 12 1/2.	8.00
12 1/2 to 13.	8.25
13 to 13 1/2.	8.50
13 1/2 to 14.	8.75
14 to 14 1/2.	9.00
14 1/2 to 15.	9.25
15 to 15 1/2.	9.50
15 1/2 to 16.	9.75
16 to 16 1/2.	10.00
16 1/2 to 17.	10.25
17 to 17 1/2.	10.50
17 1/2 to 18.	10.75
18 to 18 1/2.	11.00
18 1/2 to 19.	11.25
19 to 19 1/2.	11.50
19 1/2 to 20.	11.75
20 to 20 1/2.	12.00
20 1/2 to 21.	12.25
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23 1/2 to 24.	13.75
24 to 24 1/2.	14.00
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99 to 99 1/2.	51.50
99 1/2 to 100.	51.75

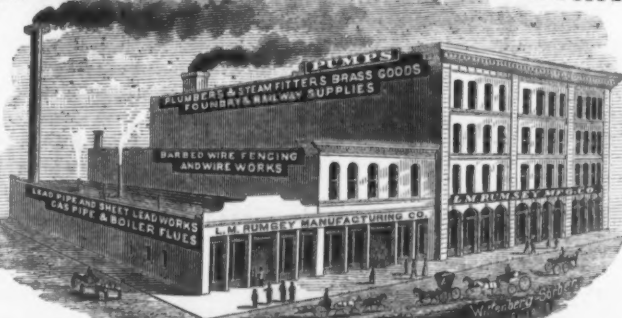
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Best Quality Refined Cast Steel.  
Squares, Flat, Octagon and Round.

14 and 3/4 to 3 inches	130
14 and 3/4 to 4	130
16 and 1/2 to 5	140
16 and 5/8 to 6	170
32 inch	210
1 inch	200



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**GAS PIPE & FITTINGS**  
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**WM. A. CLARK'S PATENT EXPANSIVE BITS WITH TWO CUTTERS EACH.**

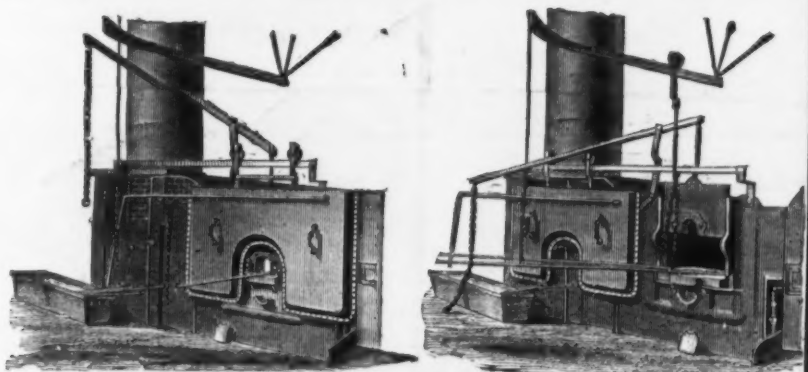
Small Bit Boring from 1/2 in. to 1 1/2 in.; Large Bit Boring from 1/2 in. to 3 in. Warranted.

Made of Jessop's Cast Steel, and Parts Interchangeable.



Manufactured by  
**R. H. BROWN & CO., Westville, Conn., Successors to W. A. CLARK.**

**McDONALD'S**  
**PATENT SHIELD.**

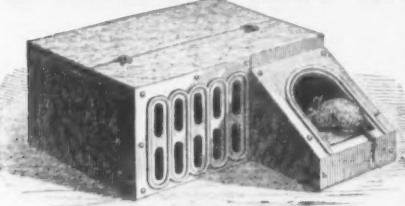


For Protecting the Men from Heat when Working in Front of  
Puddling, Heating and other Furnaces.

**H. McDONALD, Patentee,**  
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**IRON & STEEL BOILER PLATES & SHEETS.**  
Brass and Iron Fittings for Steam.  
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RAILWAY AND BOILER MAKERS' SUPPLIES.  
**AGENCY NATIONAL TUBE WORKS CO.**

**Delusion Rat and Mouse Trap,**

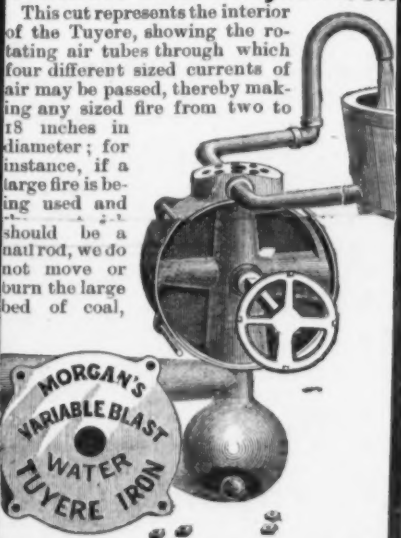


Manufactured by  
**CLAUDIUS JONES & CO.,**  
ERIE, Penna.  
This is the only Self-setting Trap on the market,  
and the most successful.  
All orders direct to  
**CLAUDIUS JONES & CO.,**  
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**COXE BROS. & CO.,**  
**Cross Creek Lehigh Coal.**

The Purity and Strength of this Coal especially adapt it for the working  
of Iron and Metals.  
GENERAL OFFICE, Room 12 Trinity Building, 111 Broadway, New York  
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**E. B. & S. W. ELY, Agents, P. O. Box 262, N. Y.**

**COAL, TIME**  
**And LABOR SAVED! BY USING**  
**Variable Blast Tuyere Iron**

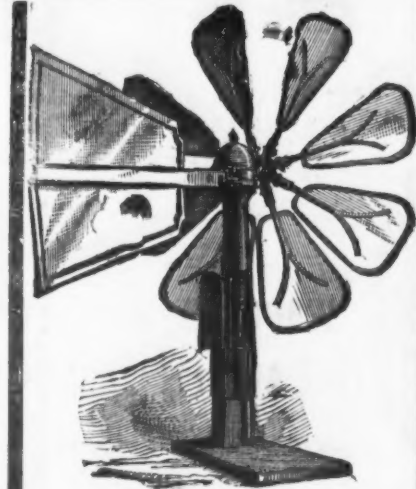


This cut represents the interior  
of the Tuyere, showing the ro-  
tating air tubes through which  
four different sized currents of  
air may be passed, thereby mak-  
ing any sized fire from two to  
18 inches in  
diameter; for  
instance, if a  
large fire is be-  
ing used and  
should be a  
smaller, we do  
not move or  
burn the large  
bed of coal,  
but turn the small tube up and so con-  
centrate the heat to the point desired.  
The constant flow of water keeps the  
Tuyere cool and prevents cinders or clinkers  
from forming in the fire. To prevent the  
water from freezing in the pipes, the barrel  
is supplied with a faucet that empties the  
pipes but not the barrel. All the dirt from  
the fire sifts through the perforated fire cap  
into the dirt box, from which it is blown by  
the blast when the ball valve is raised for  
that purpose. I also furnish Tuyere Irons  
without water attachment. See first issue  
of the month.  
After having used your "Variable Blast Tuyere  
Iron" three months, I pronounce it perfect in every  
respect, and it actually saves from 25 to 50 percent  
of the coal. CHAS. VAN HORN, Earlville, Ill.  
Send for price list and discount.  
**A. W. MORGAN, Patentee and Manufacturer,**  
Office, 522 Vance Block, Indianapolis.

**WITHEROW & GORDON,**  
**Engineers & Contractors,**  
**PITTSBURGH, PA.**

**WHITWELL**  
**HOT BLAST STOVES.**

**OVER 600 IN USE.**  
The following parties either have them in use or  
under construction:  
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Chester Furnace Co., Pa.  
Davenport, Fairbairn & Co., Pa.  
Isabella Furnace Co., Pa.  
Paxton Furnace Co., Pa.  
Spearman Iron Co., Pa.  
Etna Iron Works, Ohio.  
Milton Coal and Iron Co., Ohio.  
H. Campbell & Sons, Ohio.  
Winnona Furnace Co., Ohio.  
Moss & Marshall, Ohio.  
Hocking Valley Iron Co., Ohio.  
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Metier Iron Co., Ill.  
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Union Iron Steel Co., Ill.  
Venus & Culbertson, Ky.  
Ashtabula Furnace Co., Ky.  
Northern States C. I. and S. Co., Tenn.  
Sevance Furnace Co., Tenn.  
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**THE**  
**HARTFORD COMPRESSED AIR PUMP**  
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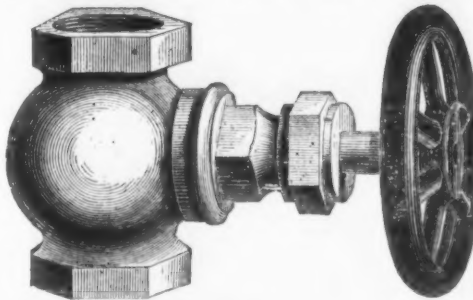
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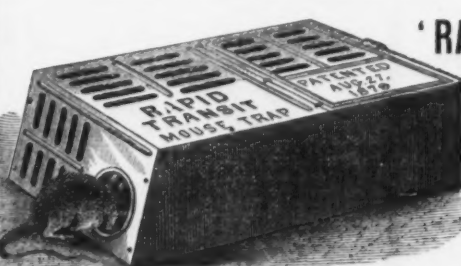
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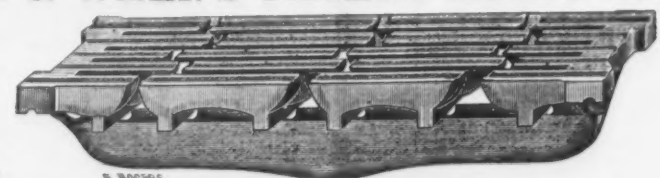
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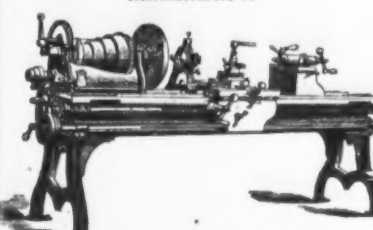
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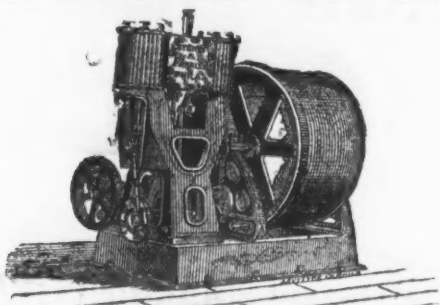


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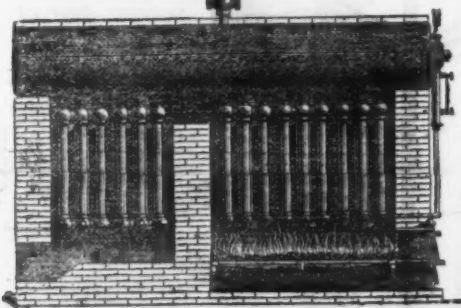
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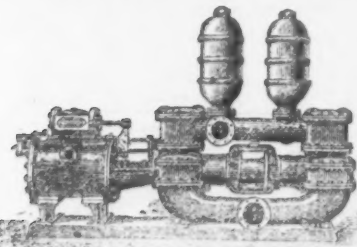
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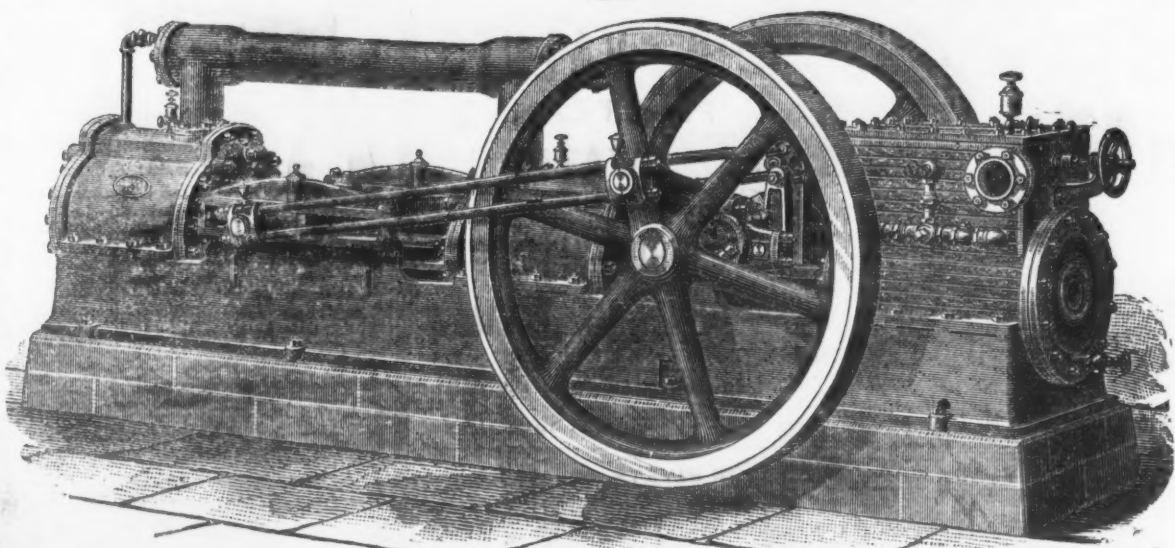
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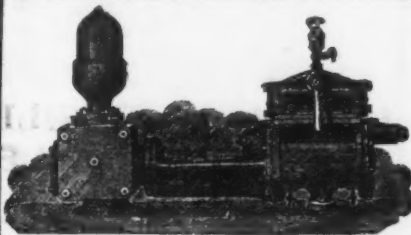
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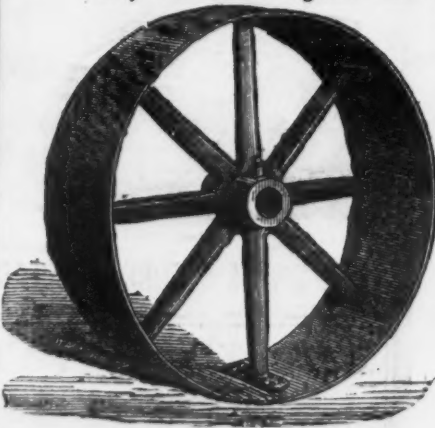
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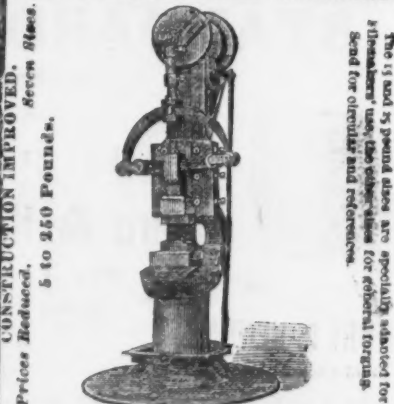
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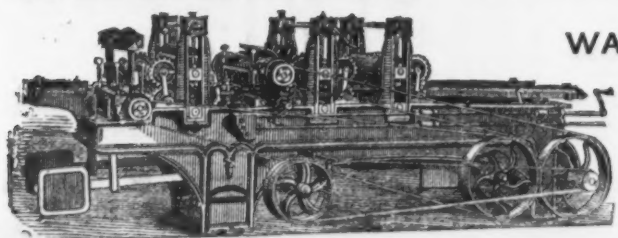
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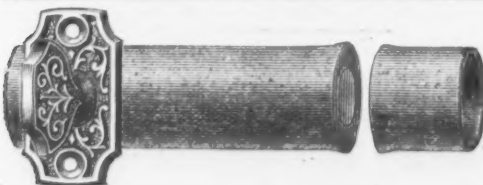
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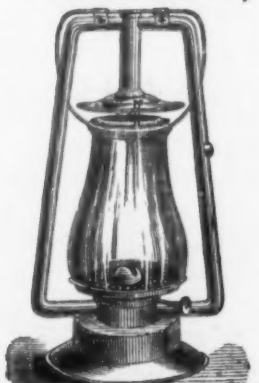
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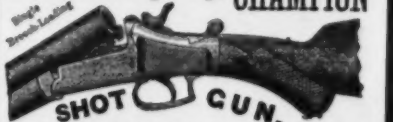
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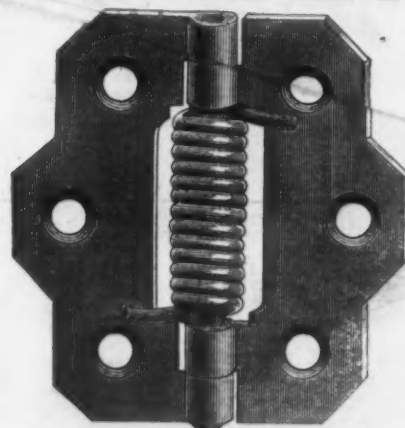
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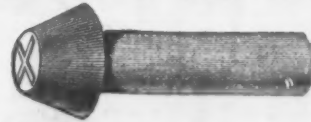
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